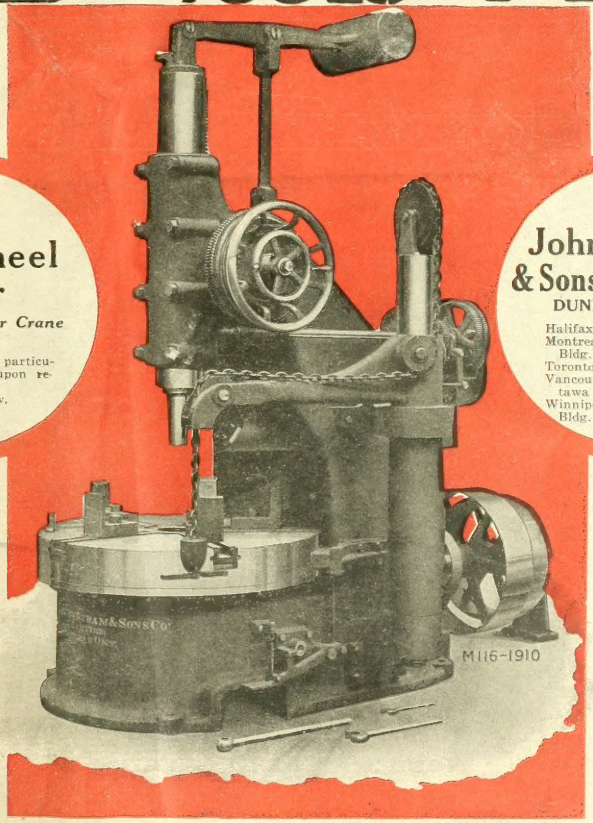
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXI. No. 26. Publication Office: Toronto, June 26, 1919 Subscription Price $3.00 per Year

BERTRAM
MACHINE
TOOLS



42" Car Wheel Borer

Equipped with Air Crane for Wheels

Photograph and full particulars gladly mailed upon request.

Write us now.

The John Bertram & Sons Co., Limited
DUNDAS, ONTARIO

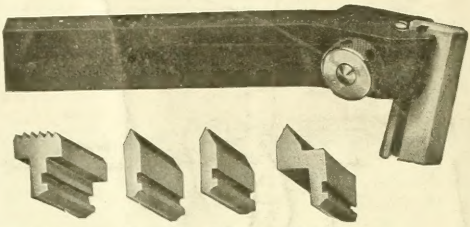
Halifax—Davidson Bldg.
Montreal—723 Drummond Bldg.
Toronto—1002 C.P.R. Bldg.
Vancouver—609 Bank of Ottawa Bldg.
Winnipeg—1205 McArthur Bldg.

Locomotive and Car Shop Equipment, Structural and Bridge Shop Machinery, Repair Shop Machinery, General Machine Shop Equipment

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SMALL TOOLS

P. & W. Threading Tools



Uses the same holder for chasers and single point cutters. The change can be made in a jiffy.

A few of its advantages:

Threads can be cut very close to shoulder.

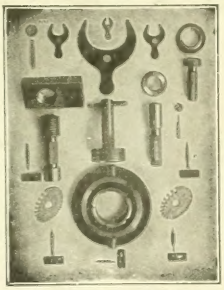
Tools are sharpened by simply grinding off top of cutter.

Combines economy with all features essential in a threading and forming tool.

Cutters have 15 deg. clearance, which experience has taught gives the longest wear in various metals.

PROMPT SERVICE

is assured at our nearest office. Place your order there to-day.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

Precision Machine Tools

PRATT & WHITNEY CO.

OF CANADA, LIMITED

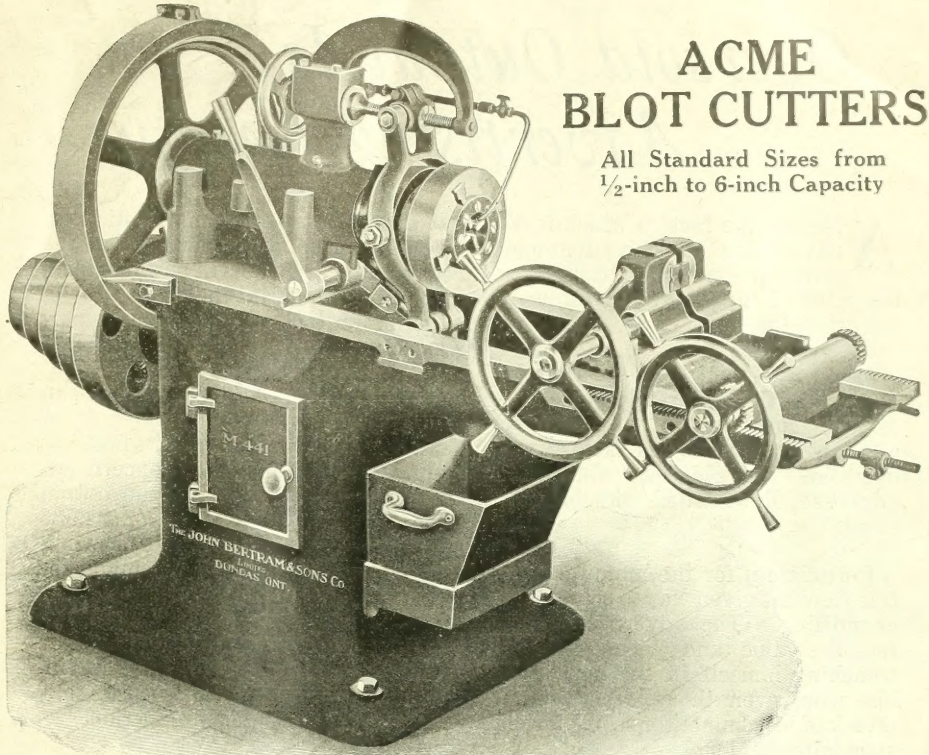
Works: DUNDAS, Ontario

MONTREAL	TORONTO	WINNIPEG	HALIFAX	VANCOUVER
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BERTRAM MACHINE TOOLS

ACME BLOT CUTTERS

All Standard Sizes from
½-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE
OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company
Limited
DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1102 C. P. R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | HALIFAX Davidson Bldg. | WINNIPEG 1205 McArthur Bldg

The Publisher's Page

TORONTO JUNE 26, 1919

Oversold Output Is Advertising Impetus

AMONG the factors which make advertising such a dominant force in American business is the faith of the largest investors in the printed word.

It wasn't so long ago—as a matter of fact has the time really passed?—that a manufacturer curtailed his advertising because his factory was oversold. The old cry, "Nothing to advertise; I'm flooded with orders," ruled.

Fortunately for the manufacturer, this view has given way to sound merchandising. The advertiser to-day sees the value and necessity of intrenching himself in the market he has won, even though the counter attack of his competitor seems far off, even improbable.

Back in the days when the world was engaged in position warfare it was a principle that a portion of captured line must be **consolidated** without delay. The whole idea was this—a section of the enemy's line had been captured, but that enemy's dominant purpose was to reform his forces and counter attack. Sometimes the position was lost and taken a dozen times.

This necessity of consolidation, of digging in and preparing for the counter thrust, exists in business. And the more important the position held, the more tempting is the counter attack desire.

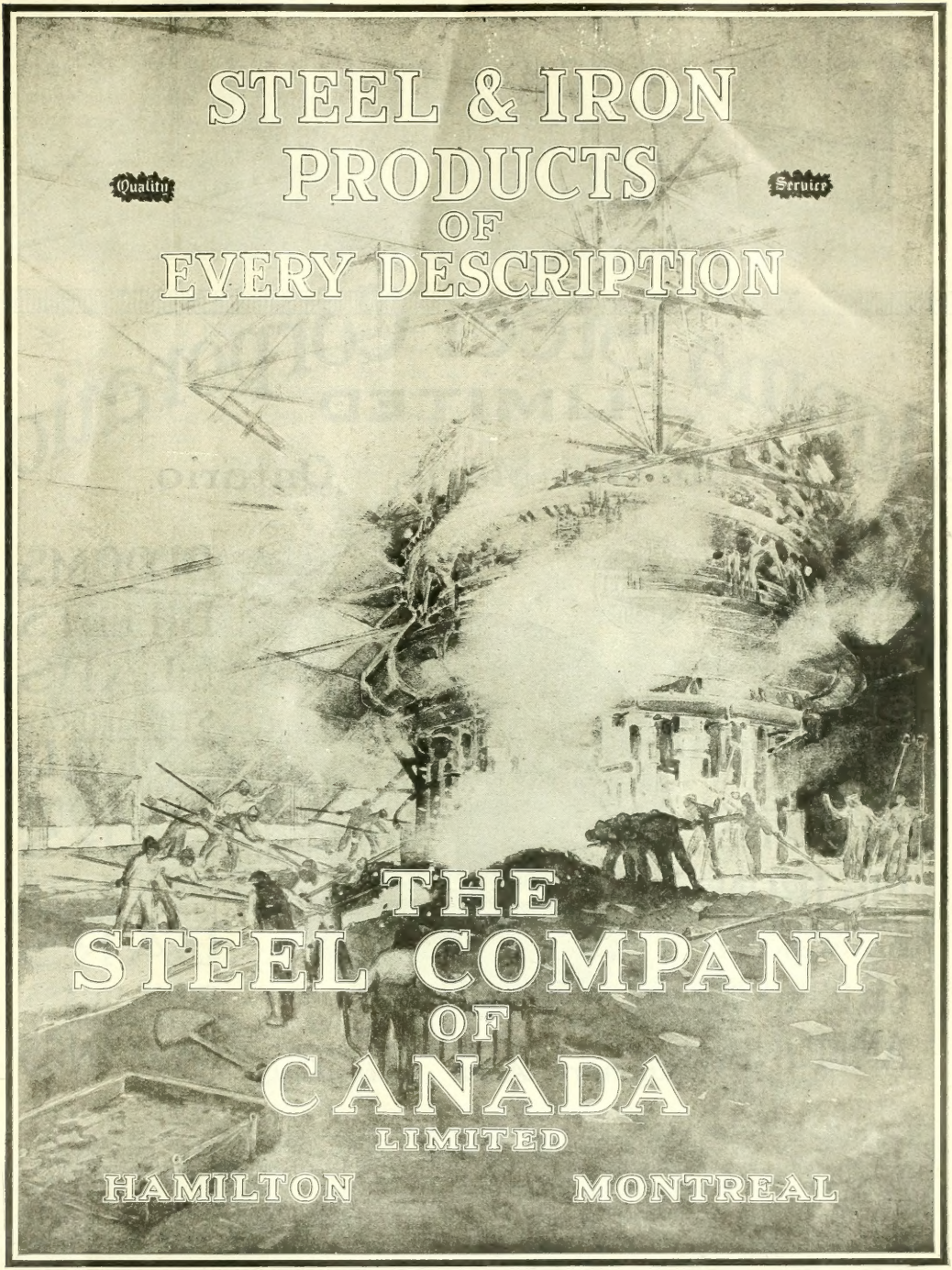
The Goodyear Tire & Rubber Company recently threw a bulwark of newspaper pages between its business and competition. This concern advertised that in spite of an output increased to an average of 24,536 finished tires a day, it had been impossible to meet existing demand for its product.

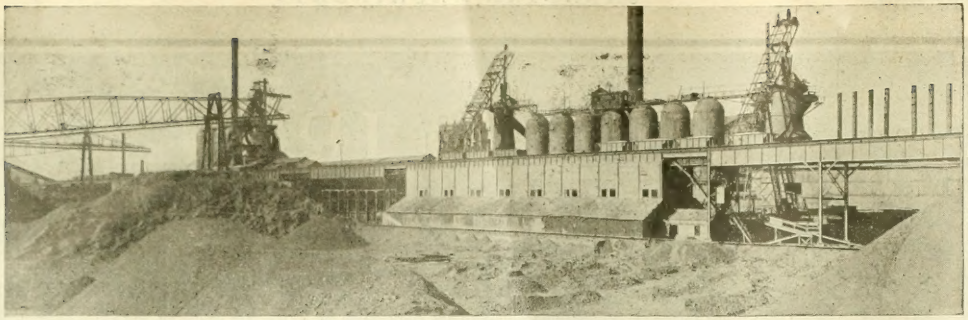
The consumer is told that the Goodyear Company regrets its inability to serve all of its customers, despite its increased production.

The dealer is not neglected. The consumer is asked to overlook any shortage in the dealer's stock because of the impossibility of keeping that stock complete. This is another link in a remarkably fine consolidation.

All this goes to show that this keen advertiser knows that it does pay to advertise aggressively even though the factory output is sold out a long way ahead.—Printers' Ink.

Canadian Machinery and Manufacturing News, June 26th, 1919. Vol. 21, No. 26. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as Second-Class Matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.


STEEL & IRON
PRODUCTS
OF
EVERY DESCRIPTION
Quality
Service
THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON
MONTREAL



Algoma Steel Corporation LIMITED

Sault Ste. Marie, Ontario.

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

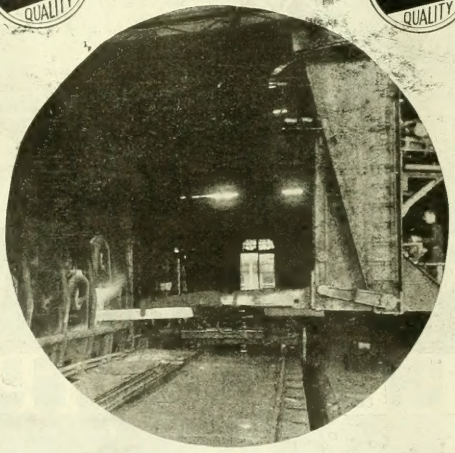
SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-
BESSEMER

SULPHATE OF AMMONIA

MARK OF ALGOMA OH QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. *Nitre Cake*

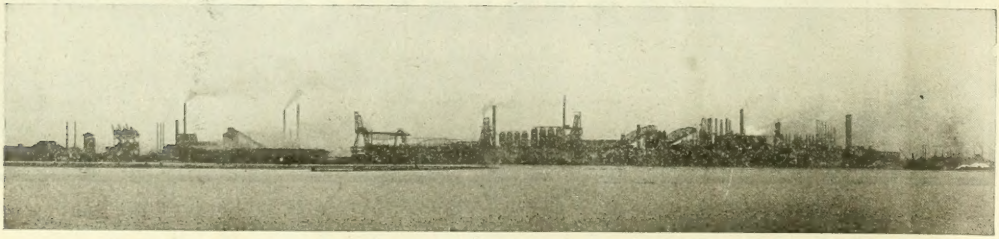
MARK OF ALGOMA OH QUALITY

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS



GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORAT ION FROM THE WATERFRONT

BRIDGEFORD

Big Chips Mean Big Production

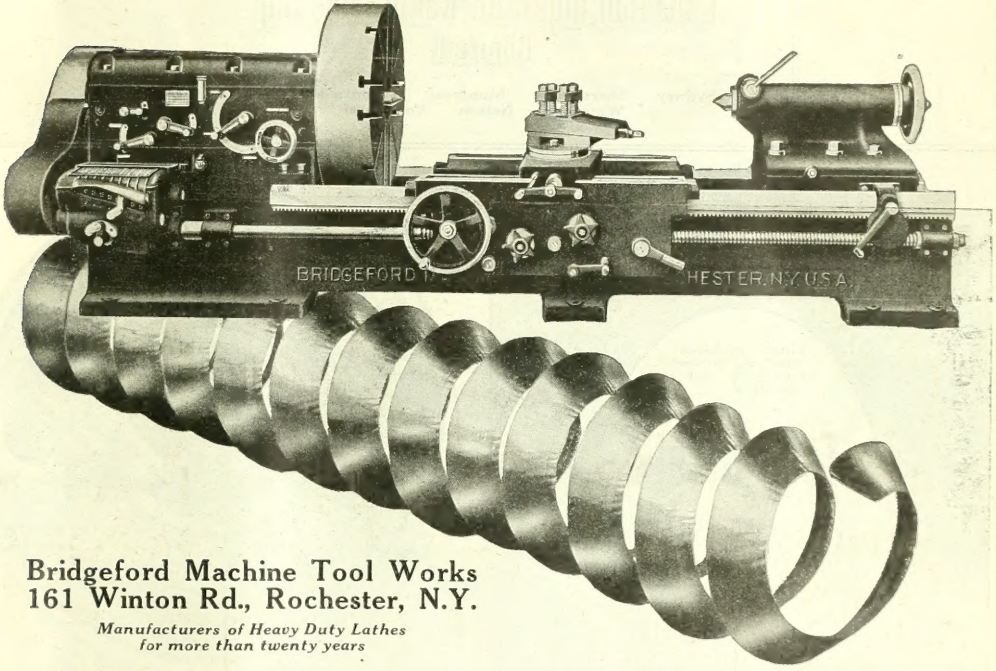
The chip shown below was taken on a "Bridgeford" from the first rough turning of a 50 point carbon steel forging in one of the prominent American plants. The feed was 1/8" and the depth of cut 7/8" at a speed of 55' per minute.

Chips like these are not unusual, as the Bridgeford is a glutton for work, taking deep cuts, with a heavy feed, working sometimes day and night and still retaining its accuracy for thread cutting and finish cuts.

Big chips mean production and you can always depend upon a Bridgeford for accuracy, production and consistent service.

One well-known manufacturing plant has 200 reasons for being satisfied with Bridgefords.

There's a Bridgeford for every heavy duty lathe requirement. If you have a lathe problem, put it up to Bridgeford. Facts and figures cheerfully furnished on request.

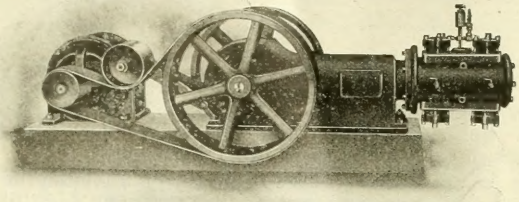


Bridgeford Machine Tool Works
161 Winton Rd., Rochester, N.Y.

Manufacturers of Heavy Duty Lathes for more than twenty years

BRIDGEFORD

COMPACTNESS



This 10" x 8" Air Compressor takes up a space of 11'-0" x 3'-0", motor and all

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS "DOUBLE ESS"

PROMPT SHIPMENTS from large stock

WOLFRAM

MADE IN THE U.S.A.

HIGH SPEED STEEL TRADE MARK

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900 Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company MONTREAL Que.

Strong in the Neck

WILT

Machine shop foremen and superintendents who invariably specify **"WILT"** when requisitioning tools know **WILT Drills** are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use **WILT Drills.** To produce more economically, use **WILT Drills.** Elimination of breakage alone will save you much.

HIGH SPEED AND CARBON TWIST DRILLS





WILT TWIST DRILL CO. OF CANADA, LIMITED

Walkerville, Ontario.

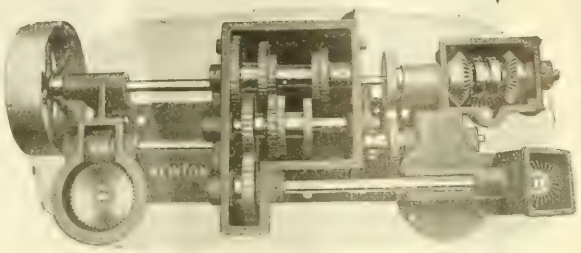
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.

"Where there's a WILT —there's the Way"

THE JOHNSON FRICTION CLUTCH

OVER THERE

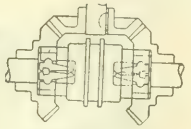
is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



Courtesy of Newton Machine Tool Works, Philadelphia, Pa

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads; note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?



Double Clutch in Nest of Gears.

Our Yellow Data Sheets are free. Send for some.

AGENTS: CANADA—Williams & Wilson, 84 Inspector St., Montreal; The Canadian Fairbanks-Morse Co., Limited, Montreal and Branches. ENGLAND—The Efandem Co., Limited, 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth St., Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perrenoud, 78 Lombery du Temple, Paris.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

E S&M

ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings
for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

G G

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

Milwaukee, Wisconsin

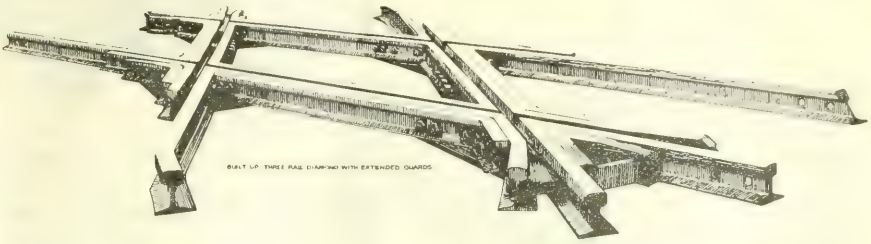
DETROIT—823 Dime Bank Building

TRACKWORK

OF ALL KINDS FOR STEAM AND ELECTRIC RAILWAYS

Built-up, Hard-Centre and Solid Manganese-Steel

Manufacturers of Balkwill Articulated Cast Manganese Crossings



CANADIAN STEEL FOUNDRIES LIMITED

Transportation Building, Montreal

Electrite

Electric furnaces, automatically regulated, the most modern methods, and **the introduction of Uranium** — make this a steel of truly remarkable cutting properties.

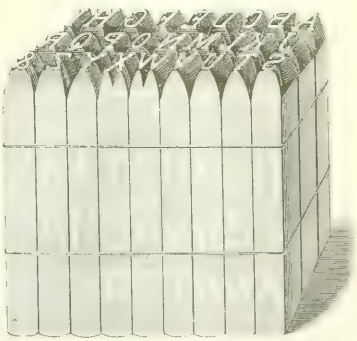
We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

High Speed Steel

Uranium



STEEL STAMPS

FOR MARKING ALL CLASSES OF METAL WORK

We will Give You Satisfaction on all Work of this Kind.

Send for Prices

PRITCHARD-ANDREWS CO.
OF OTTAWA
General Engravers and Die Sinkers
264 SPARKS ST. OTTAWA, CAN.

FORD-SMITH

GRINDERS

FOR EVERY
CLASS OF WORK



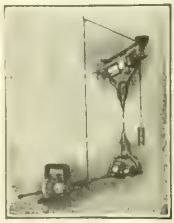
General Purpose Grinder



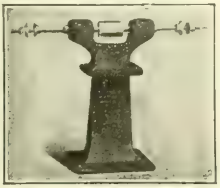
Water Tool Grinder



Heavy Type Floor Grinders



...ing Grinder



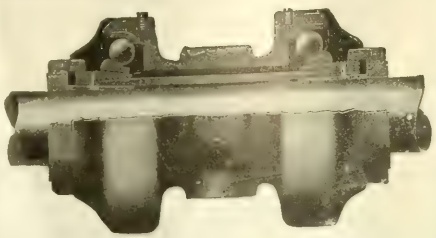
Polisher and Buffer

Modern, rigid, well-balanced machines that give real grinding service.

Manufactured by

The Ford - Smith Machine Co.
LIMITED
HAMILTON, ONT. - CANADA

CLEANLINESS CAPACITY



EFFICIENCY DURABILITY

A Time Tried and Proven Economy Bearing Primarily Built for Line Shafting

THE ESTEEM in which CHAPMAN DOUBLE BALL BEARINGS are held is born of a certain and intimate knowledge of their superiority in actual service and power saving ability, an estimation which is highest among over 4,000 plants using them.

A Few of the Many Well Known Plants Using Chapman Double Ball Bearings

Pierce-Arrow Motor Car Co.....Buffalo, N.Y.
Bethlehem Steel Co.....South Bethlehem, Pa.
Ford Motor Co.....Walkerville, Ont.
International Harvester Co.....Hamilton, Ont.
Goodyear Tire & Rubber Co...Bowmanville, Ont.
Canadian Rand Co.....Sherbrooke, Que.

Chapman Double Ball Bearings are built so as to fit any hanger frame.
They reduce power costs 15% to 40%.
They are entirely drip proof.
They are dust and dirt proof.
Require lubrication once a year.
They increase production.

Send for Catalog No. 3-B and Proof

The Chapman Double Ball Bearing Co., Limited

339 Sorauren Ave., Toronto, Canada
408 Shaughnessy Bldg., Montreal, Que.

The Transmission Ball Bearing Co., Inc.
1050 Military Road, Buffalo, N.Y.
New York, Cleveland, Chicago, Philadelphia, Cambridge, Mass.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

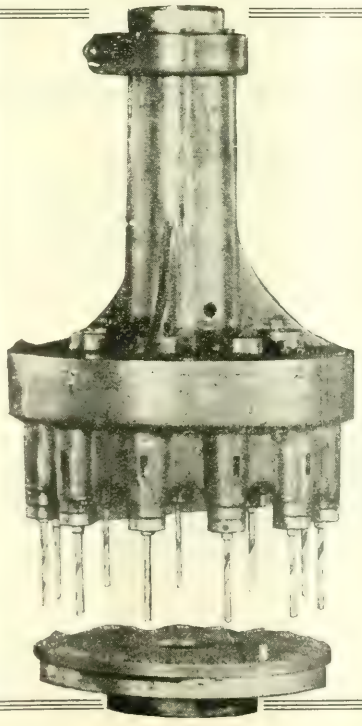
Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process





SPEED UP THE WORK

Rising costs are knocking the bottom out of profits these days! Materials and labor are up. No chance to reduce them. But you can speed up your work. The Hoefer Manufacturing Company has a proposition that will cut your drilling cost. Not guesswork, either, but on a basis proved by experience.

By using Hoefer Auxiliary Heads you can drill ten, twelve or more holes in the same time as one. Not only do you save the drilling time, but also the time lost shifting the jigs and raising and lowering the spindle for the extra holes.

360 manufacturers, 99 distinct lines of business—probably some of your competitors—employ Hoefer Auxiliary Heads to increase profits. They say the Hoefer Auxiliary Heads pay for themselves in 30 to 60 days.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. Made by expert toolmakers and guaranteed to handle accurately the work for which they are designed.

Investigate now. Stop the leakage of dollars due to the use of single drills. Write for catalog and send blueprint of some of your work for estimate of time and cost.

The Hoefer Mfg. Co., Freeport, Ill.

621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Bldg., Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Keenan Bldg., Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mchy. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

The Canadian Fairbanks-Morse Company, Limited
"Canada's Departmental House for Mechanical Goods"

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Calgary Vancouver Victoria

HŒFER Auxiliary Heads

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

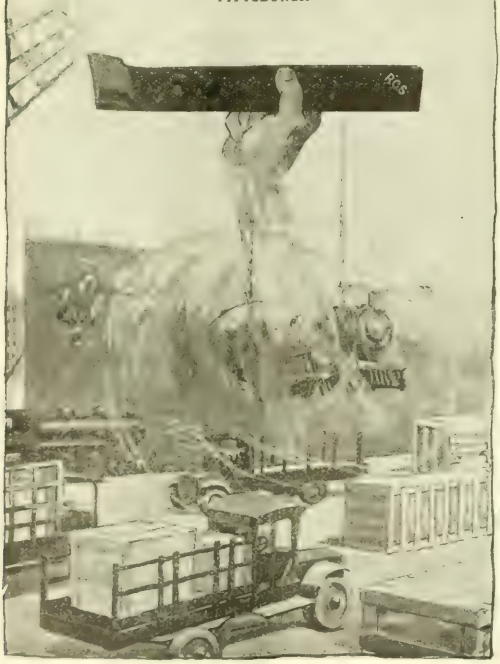
Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of "Red Cut"?

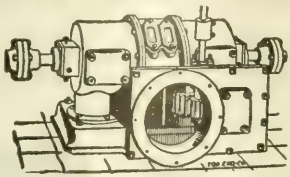
VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

BOSTON
BUFFALO
CINCINNATI
CHICAGO
CLEVELAND
DETROIT
PITTSBURGH
MONTREAL
NEW YORK
TORONTO



WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

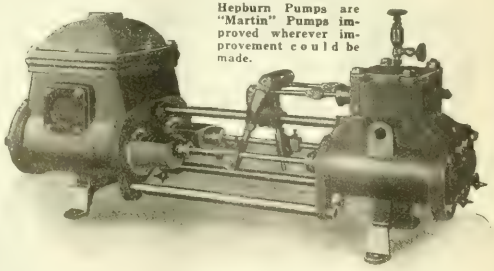
Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



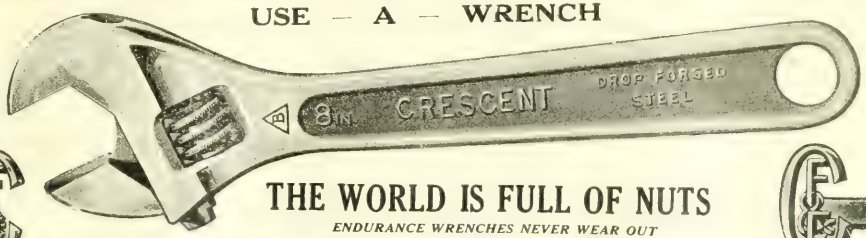
Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street Toronto, Ontario

CANADA
FOUNDRIES & FORGINGS
LIMITED

DON'T RATTLE

USE — A — WRENCH



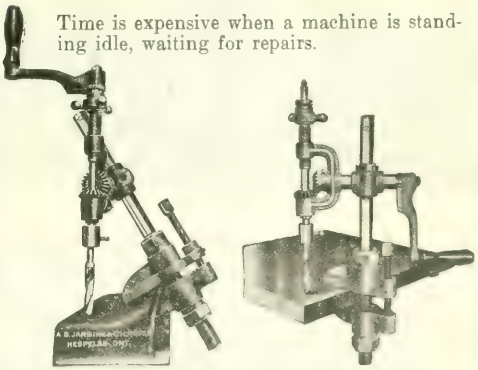
THE WORLD IS FULL OF NUTS
ENDURANCE WRENCHES NEVER WEAR OUT
CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway
RALPH B. NORTON, AGENT
Montreal, Canada

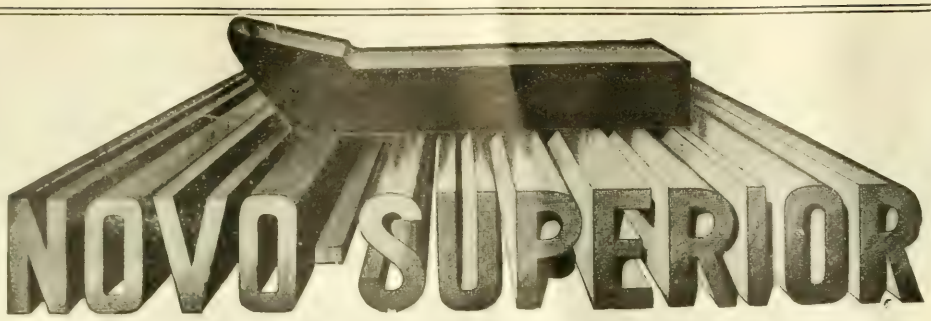
Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.
Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

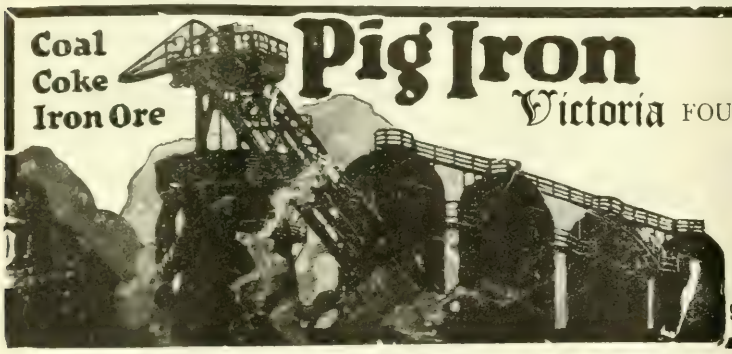
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Today thousands of Candian industrials have reduced their power-waste measurably through the correct application by Goodyear men of Goodyear Extra Power Belts to their drives.

Goodyear Extra Power Belts have increased power transmission in many cases to a remarkable degree.

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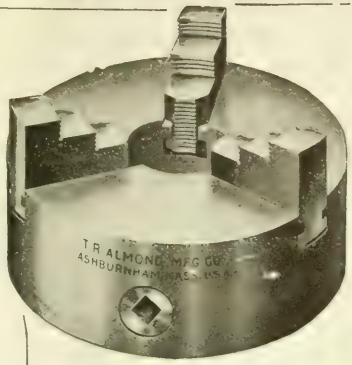
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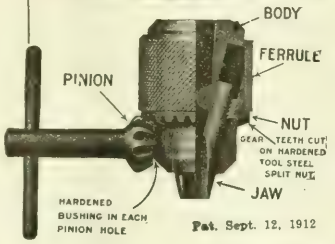
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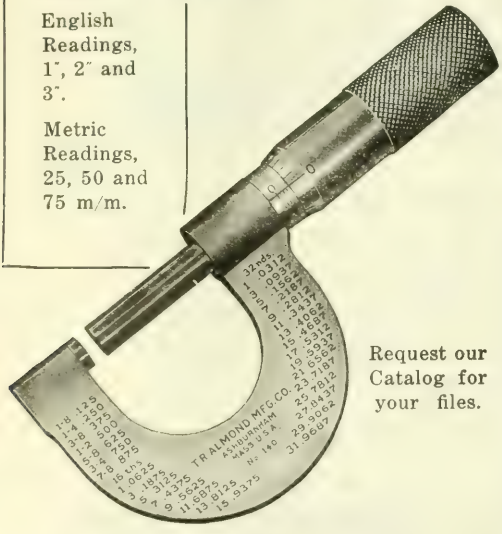
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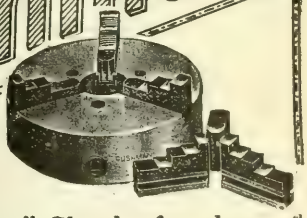


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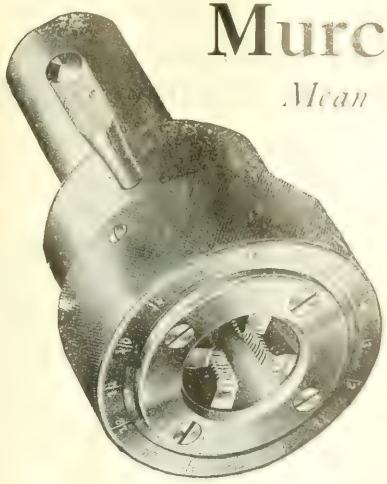
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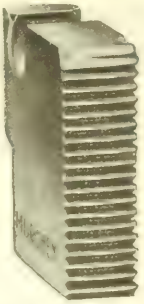
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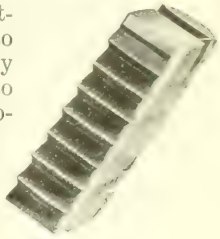
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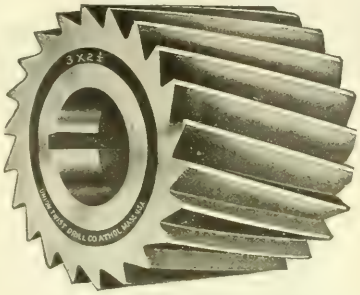


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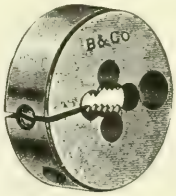
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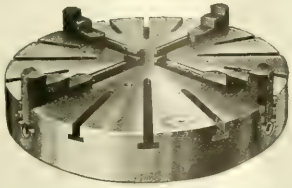


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Show preference for the
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It has an iron body, and is made heavy and strong. The double bearing ribs for the jaws make a stiffer chuck for heavy work than the ordinary single rib type.

The screws are also of the "socket" type and operate in hardened steel thrusts, which also add to the strength and stiffness of a chuck that is designed for **heavy duty.**

The jaws are wide and the screws are correspondingly large.

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Makers of a Complete Line of Chucks

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Never-Slip Wrench



It works in hard-to-get-at places—in places where a straight handled wrench could not be used. It is specially designed for pipe and nut work, and is easily operated and handled by one hand.

The sliding Jaw is a steel drop forging. The operating nut is steel. All parts are interchangeable.

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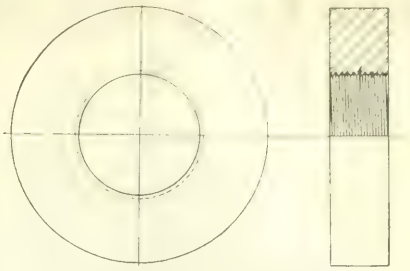
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Reduces Cost of Production

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PIECE MILLED—Threaded collar.
THREAD—Diameter 2¾", length 1¼", 8 pitch thread U.S. standard.
LIMITS—.001.
MILLING FEED—25" per minute. Not limit of machine but of hob. Job also faced at same chucking.
MATERIAL—Machinery steel.

Smalley-General Company, Inc., Bay City, Michigan

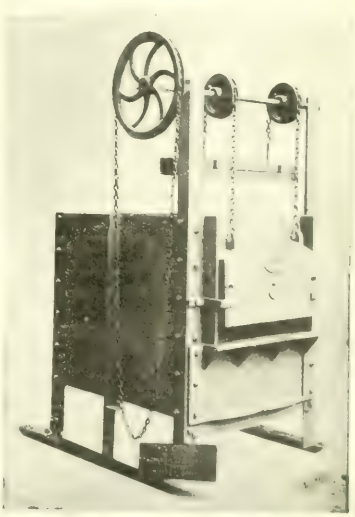
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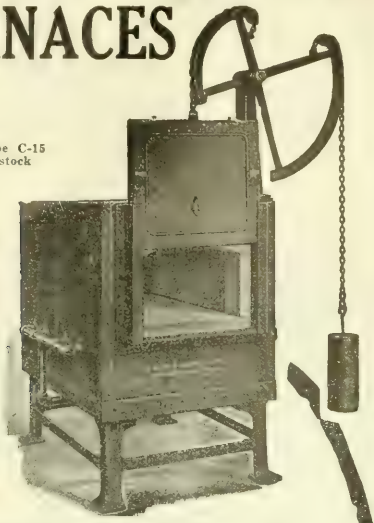


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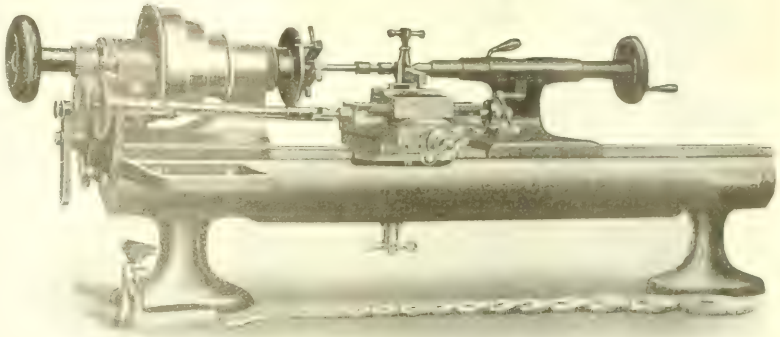
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The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

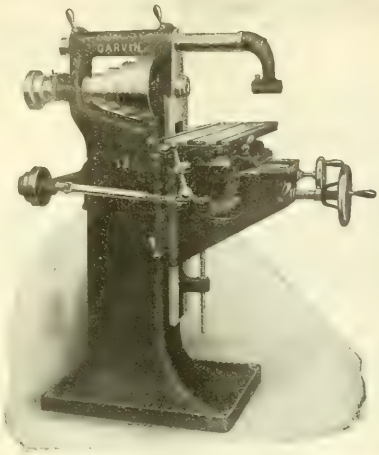
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NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

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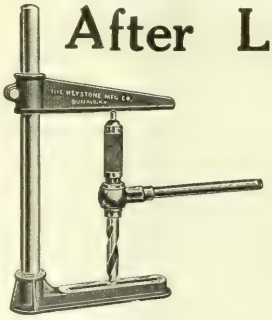
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We like to think of that.

We like to think that the reputation of Keystone Tools is built upon a foundation of service with **Quality** the Keystone rather than a copyrighted name. For it is conceivable that imitators, or even the whims of courts, might rob us of our copyrighted name. But who could take "Keystone Quality" from Keystone Tools?

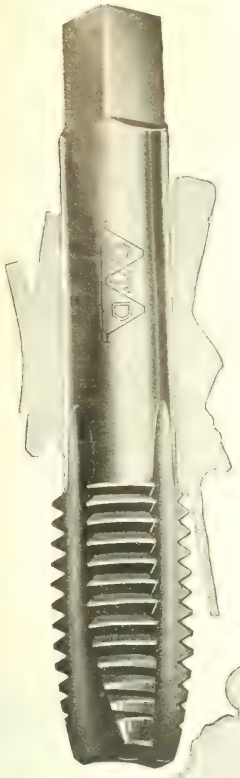
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Precision in Threading

GTD

Precision in threading can be attained only by the use of precision tools.

The "Gun" Tap

The "Gun" Tap holds all records for accuracy, speed and durability. Its shearing cut requires a minimum of driving power and is self-cleaning—it shoots the chips ahead.

The "Gun" Tap maintains its size and lead in any material.

The Acorn Die

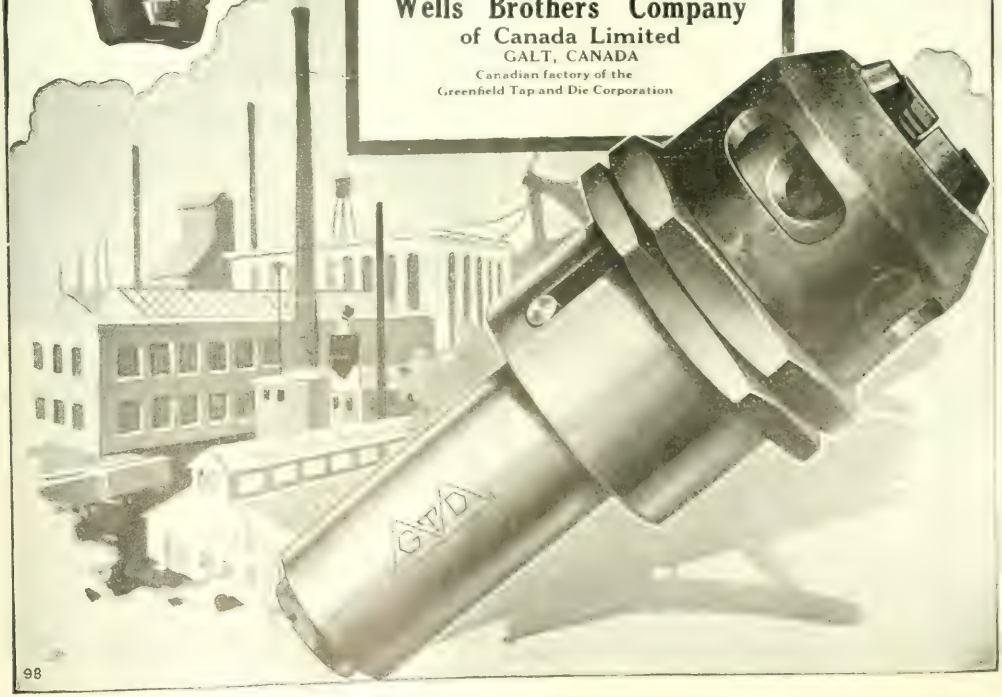
The Acorn Die is capable of a minute adjustment, holds its lead with accuracy, is absolutely rigid while cutting and will outwear a number of ordinary dies.

Nicely illustrated booklets describing the "Gun" Tap and the Acorn Die will be sent on request. Also new No. 40 Small Tools Catalog.

Wells Brothers Company of Canada Limited

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Canadian factory of the Greenfield Tap and Die Corporation



98

Note On Grinding

NORTON COMPANY WORCESTER Mass.

No. 45A



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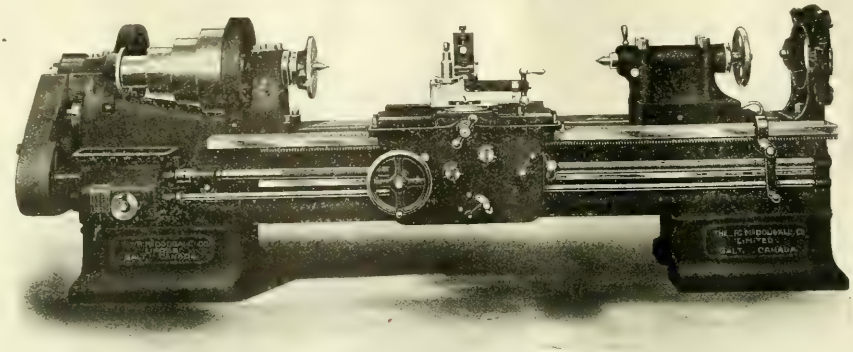
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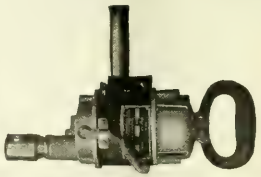
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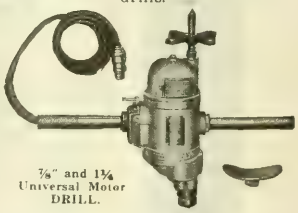
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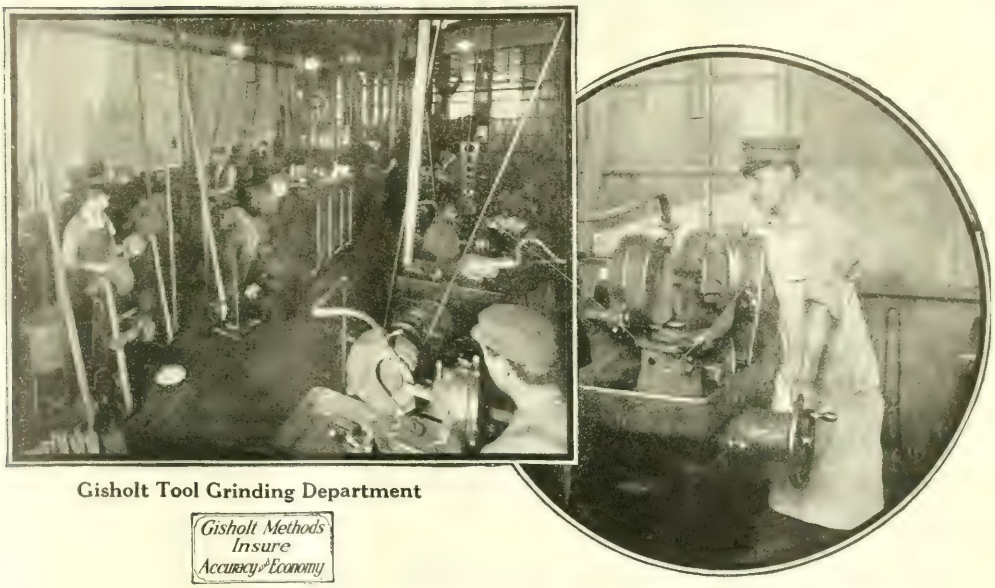
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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXI. No. 26 Toronto, June 26, 1919

Making the Hollifield Target Practice Rod

An Interesting Description of a Device Which Gives the Army Recruit All of the Actual Rifle Practice Without Either the Recoil or the Noise.

By DONALD A. HAMPSON

ONE of the problems that had to be solved at the beginning of the war was how to teach the vast new army to shoot. The production of arms and ammunition was pitifully small for a long time, and very little of this could be spared for use in camps. A majority of the recruits had never even handled a gun before, much less learned to fire one accurately. It was quite natural that the War Department turned to the Hollifield Rod for training purposes, a device that had been used to a limited extent in the army before, and to a large extent by the U. S. navy made just as in actual range work; the rod is speedily drawn back into the tube by a spring, when the device is ready for another shot. As far back as 1878 some sort of a device along these lines was experimented with, but lack of interest in arms and target practice caused it to be dropped.

It will be seen that by the use of the Hollifield Rod, which is at present the only apparatus suited to the instruction of large numbers at any time or place, the recruit is given actual training in handling, aiming, and firing the rifle, and that the training can be prolonged indefinitely without further expense other than the initial cost of the device. When not in use by one recruit, another may use rifle and device, so that the distribution of a few rifles and devices to a company is the means of quickly bringing that company up to a set standard of efficiency in marksmanship and at no great expense. This training of eye and muscles preliminary to actual work is in line with the modern practice in other fields where dummy street car platforms for motormen, vestibule schools for factory hands, shadow movements for time study work, etc., are the means of saving long and expensive periods of "breaking in."

The Hollifield device gives the recruit all of actual rifle practice with the exception of the recoil and the noise. (As a matter of fact the Hollifield Co. has successfully worked out attachments which give these realistic additions to dummy practice, but the plain device is considered all sufficient by army officials.) For rapid-fire work, a set of dummy cartridges is used, these being loaded from the clip just as regular ones, provided with an interior rod so that they may be fired in turn, and being ejected from the gun by the usual bolt action.

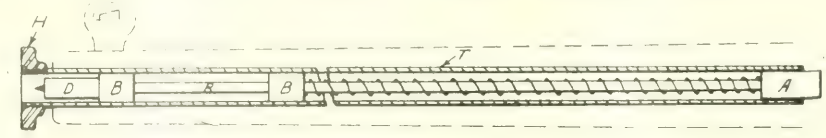


FIG. 1. A SECTION THROUGH THE DEVICE.

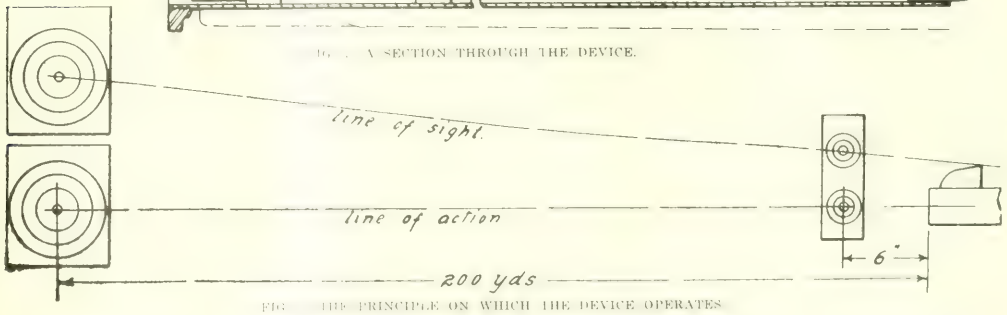


FIG. 2. THE PRINCIPLE ON WHICH THE DEVICE OPERATES.

This device is made by the Hollifield Target Practice Rod Co., of Middletown, N. Y., and is the development of a patent taken out by an old army surgeon, Dr. H. B. Hollifield, of Washington, D.C., Briefly, the device consists of a brass tube which is slipped into the barrel of a rifle, the tube containing a rod, which is held normally back against the bolt of the gun, but which is ejected by the blow of the hammer so that the sharp point of the rod strikes a miniature target placed about six inches from the muzzle of the rifle. A record of the shot is thus

Though quite simple in construction there are a number of points of interest in the manufacture of the rods. The materials are received in the form of bars and tubes, and the labor consists of screw machine and bench work, threading and assembling.

Fig. 1 is a section through a device. T is the brass tube of 0.030 in. wall, with a brass head H which serves as a puller and prevents shoving too far in the rifle. The rod R slides in bearings BB and has

a soft steel butt piece A against which the firing pin strikes and a needle point of hardened tool steel D which is driven against the target. The rod R is polished drill rod, 0.109 in. in diameter, made by manufacturers of knitting needles who give the same temper and finish to these rifle length pieces as to their regular product. The pieces A and D are tapped 7-64 in. by 48 and screwed home on the rods.

In Fig. 2 will be seen the principle on which the device operates and which makes it as true a test of the rifleman's skill as is outdoor range work. It is the old principle of similar triangles, and though the limits of the page necessitate a greater angle, it shows that the miniature target but two inches high and placed only six inches away is as difficult to hit as the full-sized one set at 200 yards or more away.

As anyone can tell by testing a knitting needle, the steel is given an unusual temper—is so hard that it turns a file, but has great elastic properties. In order to thread the rods for the end pieces, the temper must be drawn for one-half inch back from each end. The arrangement shown by Fig. 3 is used for this purpose. Fig. 3 is a side elevation. R and W are the parts of a rack on which about forty rods are laid at a time with their ends resting against the flame deflector S. The part W of the rack is a water-jacketed casting, and, so confined, the flame from holes in the gas pipe G heat the ends of the rods almost as quickly as they are properly arranged. As fast as the ends get up to a full red the rods are plunged into a box of lime close by—this treatment completes the annealing so that the rods may be threaded; after the box is full—about ten thousand rods—the rods are annealed on the other end.

Threading is done in a special machine which employs an Errington tapper for the reverse. The rods are gripped in a vertical position by a quick-acting clamp, with end projecting downward toward the die, which is brought up to the work from below. A style of die holder is used with the tapper that permits free washing out of the chips by the cutting oil that is piped to the end of the rod being threaded. By this arrangement a minimum of oil is left on the rods to wipe off, and the operator can devote all his attention to filling the machine. About 3,500 threads a day are thus turned out.

Commercial straightness is not accurate enough for rifle practice work, and each rod has to be hand straightened so it is not more than one-thousandth out at any point. This is so slow a job that experienced men straighten not over two hundred rods in a day. The operation is similar to the one employed on some twist drill and reamer work, but the great length of these rods, their small diameter, and the hard temper, puts the work in a class by itself.

Fig. 4 shows the bench fixtures used. Straightening blocks B of hard, close-grained cast iron, 3 in. by 3 in. by 26 in., finished all over, are set in a holder and placed so the upper surface is on the level with the workman's eyes. The blocks are tilted slightly; in drill practice, if a part will roll down this incline it is straight enough, but for this rifle work the rod must pass the more rigid test of shutting out all light as well. Sheets of heavy white paper, C, are fastened back of the block, and behind these, lights are placed. The workmen thus do not face any direct glare, as outside light is also closed off. The rods are straightened by hammering down the high spots with a 4 oz. pein hammer. Extra blocks are kept ready at all times. The constant driving of hard rods in the cast iron surface grooves the latter quite rapidly so that the four sides last only a week before replaning is necessary.

A certain percentage of all rods is tested for correct temper. The simple test fixture shown in Fig. 5 is used for this. Two pins are set in a piece of sheet steel near one end and the graduated arc is laid out at the other. Normally the rod stands as shown—free end pointing to 1—it must stand bending around against the pin at 8 without breaking and must return to 1 again, to pass inspection

The screwing on of the butts, points, and brass heads is no small item. The brass tubes are threaded in a machine of the geometric type, using an opening die. To prevent tearing of this fine thread in soft brass, the dies are brushed (while revolving) every dozen cuts with a brush slightly damp with lard oil. A hand fixture is employed to screw the head on the tube, the head being gripped in a collet that does not mar the knurled edge, and a friction device slipping before excessive pressure can be applied at any point.

The pieces that go on the steel rod have a thread ⅜ in. long. These pieces are started on by hand and then taken to a sensitive drill that is equipped in the manner shown in Fig. 6. A two-inch common bench vise is fastened to the table of the machine to be used as a holder for the rods while the butt pieces are tightened up. In this connection, it might be added that a vise will often do as well as any holding fixture that might be made up and at considerably less expense. The driving mechanism is fastened in the drill spindle, which is running all the time. It consists of an adjustable friction device X that is set to give a uniform driving tension without twisting off the rods and a ball chuck Y that grips the butt. This chuck has three ⅜ in. balls very near its lower end, confined in recesses that are cam shaped to allow a release and a gripping position, as in usual practice. No springs are required, the contacting surfaces automatically roll the balls into place as the spindle is brought down and a quick lift disengages them.

The needle-pointed ends, of course, must be screwed on after the rod is put into the tube. Owing to commercial variations, it is necessary to correct any eccentricity of the point after it is in its final tight position on the rod. The fixture shown by Fig. 7 was made for this purpose. The assembled outfit is laid in a V block at its breech end, which also projects the rod as shown. In this position the extreme end of the rod comes in a slot in the hardened block B which serves as a rest, anvil, and grip,

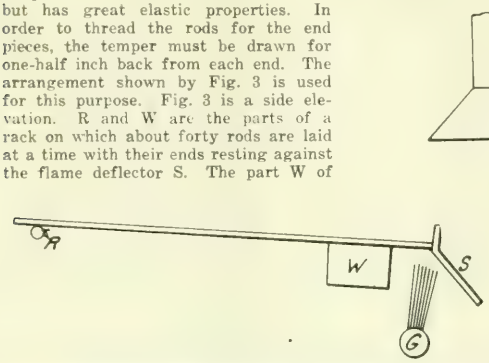


FIG. 3 THE ARRANGEMENT TO DRAW THE TEMPER FROM THE RODS.



FIG. 4—BENCH FIXTURE USED FOR STRAIGHTENING BLOCKS.

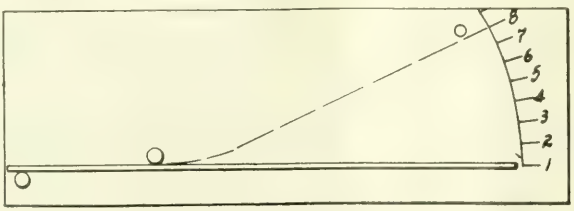


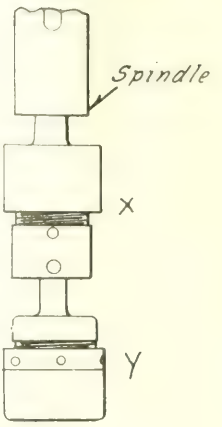
FIG. 5—TEST FIXTURE FOR TEMPER OF RODS.

the slot being a snug running fit on the rod. By twirling the rod between thumb and forefinger, the workman sees any inaccuracy in the slowly revolving point. This he corrects by driving on the body of the point with a light hammer. The celluloid card placed just back of the point greatly assists in this work, it being possible with its graduations to instantly "spot" an error as small as the width of a line.

A final test of the outfits is made in the service rifle rigidly clamped in a fixture which incorporates a testing target accurately aligned with the line of action and of sight. To pass this final test, it is necessary to go to the seeming needless accuracy in manufacturing; an error of 0.005 in. in one of the rods would be doubled if the rod turned (rotated) from top to bottom, with a corresponding disparity on the target card with its fixed centres of bull's eyes. Though unbelievable to the layman, "gun sharks" are able to detect such minor inaccuracies when holding the rifle in natural firing positions.

The screw machine work presents nothing unusual from good practice. One part, the bullet for the dummy cartridges, has a nominal 0.112 in. hole for a depth of 15-16 in. This is made as in Fig. 8 by using drills one size larger than the last and dividing the work among three positions on an Acme, making a short easy drilling and a minimum of time per piece. Some of the other parts are made two or more at a time and some two per cycle by double camming on single spindle machines. All the 7-64 in. tapped holes are tapped off the automatics, the wisdom of not retarding the automatics with this delicate operation being thoroughly proven by the decreased time loss with tap breakage.

Other work connected with the Hollifield Rods consists of making the rubber target holders, against which the hardened needle points strike, the containers for the outfits, attachments for using the bayonet as a support when practising in the field, etc. Besides the service outfits, the device is made for sporting rifles, and as such has a field of usefulness at all times of the year for competition and keeping marksmen in [illegible] training



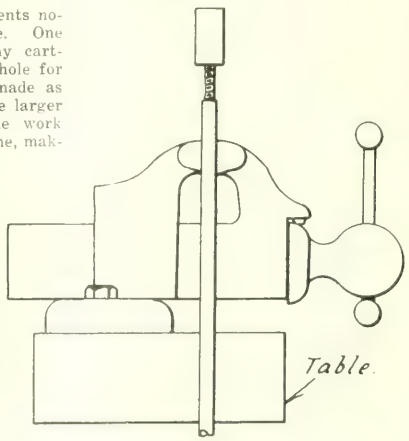


FIG. 6. FIXTURE USED TO SCREW THE HEAD ON THE TUBE

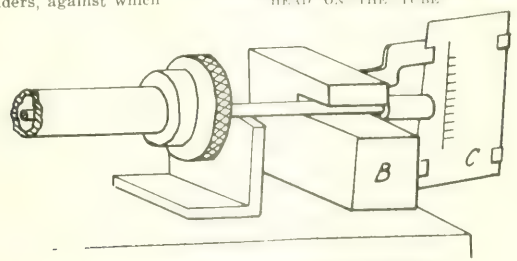


FIG. 7. TEST FIXTURE FOR ECCENTRICITY

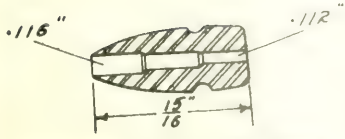


FIG. 8. THE BULLET FOR THE DUMMY CARTRIDGES

AFTER-WAR PRICES

No subject is quite so debatable as that of the conditions which will ultimately rule as to the price of commodities when the aftermath of war has been stabilized. On the other hand, there is the belief not merely that pre-war prices will never return, but that a very large permanent increase in all directions is certain; on the other, the belief is tenaciously held that the stagnation which has been the result of previous wars will bring prices ultimately to a point within hailing distance of those of 1914. It is extremely difficult to be a prophet, and, in addition, it is a role which is by no means comfortable, as history in the past has shown. There is argument enough and to spare to support both views. That individually the present generation and that following are certain to be intrinsically poorer cannot be doubted, the point at issue is in what proportion. Liquid capital, owing to the exigencies of the situation, will command a higher return, but this in itself is nothing deplorable. Interest rates are based upon two factors: activity of demand and available amount. Capital being accumulated, collective savings, and war being a sort of rake's progress, the amount has been seriously depleted, while essential restoration in every direction will make enormous calls upon the collective purse.

The resilience after the exhaustion of war depends upon productivity and the limitation of wants, upon united effort and collective thrift in order that the reconstructed state shall be something more than solvent, that it shall be prosperous. Taxation is only one among many other things which will help the individual to limit his desires. The State will have to see that the accumulated capital is utilized within its own borders, and will be wise enough to penalize the export of wealth. After all, it is not the extent of the commitment that matters so much as the belief of the creditor that the debtor, given time, can pay; that is, it is the credit standing which affects the results.

High prices will prevail for a considerable spell after hostilities cease, no sane man can doubt, for essential trade will be more than fully occupied in overtaking arrears added to the further avalanche of essential work postponed owing to present needs. Certain prospective utility work of national character—to be exact, housing—contemplates a 70 per cent. increase for five years and a permanent increase of 30 per cent. above 1914 prices. These are the only definite figures yet given as the considered conclusions of responsible men.

In engineering matters, which concern this journal most, certain facts must be realized in any due perspective of the future. Although the machine value per productive unit has shown a remarkable increase, a very large proportion of machine tools have had their life shortened by years and renewal will be the order of the day.

Audible Electric Signals in Industrial Plants

An Extract From a Paper Presented Before the Rochester, N.Y., Section of the American Institute of Electrical Engineers, Also Before the Erie Section of the Same Organization

By V. KARAPETOFF, Professor of Electrical Engineering, Cornell University, Ithaca, N.Y.

NO industrial plant of any magnitude may be considered fully efficient unless means are provided for promptly locating any important employee, no matter where he may be within the plant. A private telephone system, however extensive, serves this purpose only as long as the needed man is at his desk, but as soon as he leaves his desk the problem of locating him becomes a hit or miss proposition. On the other hand, a superintendent, a foreman, a millwright, a repair man, etc., is ordinarily useful only in so far as he can freely move about the shop without the fear that someone of importance may need him. Thus, within the last few years, under the tremendous impetus of the pressure for an enormous increase in the production of munitions of war, audible electric signals have been introduced into many industrial plants.

Such an electric signal is usually similar in construction to the familiar electric "horn" used on automobiles. It consists of a diaphragm with an anvil at its centre. A toothed wheel driven by a small electric motor strikes the anvil many times a second and causes it to vibrate vigorously. These vibrations produce the well-known warning tone, which carries over a considerable distance. The device is provided with a projector or horn, the shape of which depends on whether it is desired to scatter the sound, to intensify it in horizontal direction, or to deflect it downward. Such motor driven signals are now made much more powerful than automobile horns, and are wound for 110 or 220 volts, direct or alternating current, so that they can be connected to a lighting or power circuit, and do not require a separate low-voltage battery.

With such electric audible signals scattered throughout the plant, it becomes an easy matter to locate instantly any person to whom a code number has been assigned. For example, when the manager wishes to speak to one of the assistant superintendents, who may be anywhere in the plant, he simply tells the telephone operator to sound this particular man's call. As soon as this assistant superintendent hears his call, he comes to the nearest telephone, whereupon the operator connects him with the manager.

It would be rather inconvenient for the telephone operator to sound various calls by hand; therefore a special code-calling automatic instrument has been developed for this purpose. The operator merely sets the desired person's code number on a dial and pulls a lever, a contact making mechanism is thereby set in motion which closes the electric circuit and operates the code signals throughout the plant the required number of times (usually three times) and then stops automatically.

In noisy and in open places, or in large factory lofts, the electric horns mentioned above constitute the most suitable type of signal. In offices they may be replaced by less loud electric gongs, bells, buzzers, air whistles or incandescent lamps. In some cases two separate circuits are run from the code-calling mechanism, one circuit for ordinary calls, the other for fire alarm gongs, or for some other special purpose. Sometimes two allied plants are operated side by side with a separate staff in each. Then the same code combinations can be assigned in both plants, but the horns in one or the other plant will sound according to which of the two circuits is closed.

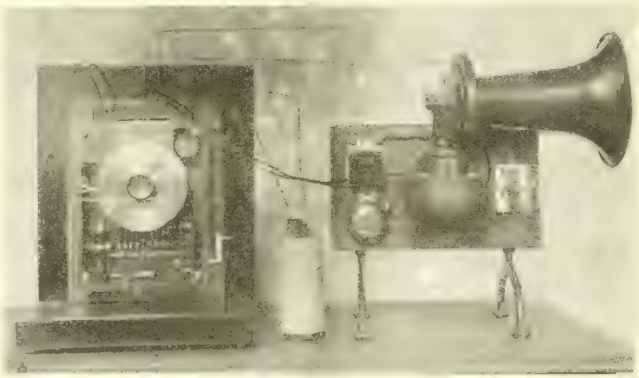


FIG. 1 KLAXOCATOR ACTUATING AN ELECTRIC HORN, A BELL AND AN ELECTRIC LAMP

A further application of loud electric horns in industrial plants is for extensions to telephone bells. The ordinary telephone ringer is not loud enough in many shops when the foreman is away from his desk. In this case a relay is connected in parallel with or in place of the telephone ringer, and when it is actuated it closes a secondary circuit which causes an electric horn to sound. This call should be a single blast to distinguish it from code calls.

Audible electric signal systems are also used in various plants as warning signals on cranes and hoists, also to call a shifting locomotive, to indicate the beginning or the end of a certain operation, or for other local purposes. Like in the case of any convenience, once such an electric system has been installed, the superintendent, the foreman, and even the operatives themselves will find new uses for it.

Editor's Note:—At Fig. 1 is shown one of these code-calling instruments. The name given this instrument is that of Klaxocator, and the signals which it actuates are an electric horn, a bell and an electric lamp.

LOWERING A HEAVY STEEL PLATE

By H. J.

An interesting engineering operation is reported concerning the lowering of a heavy steel plate at the gas works of the Consolidated Gas, Electric Light, and Power Company of Baltimore, Md. The plate, which is to form the bottom of the tank containing the new gas-holder, is 219 feet in diameter, and weighs 234 tons. It was delivered in the form of $\frac{5}{8}$ in. sheets of steel plate averaging 12 feet by 6 feet. These plates, supported on wooden troughs, were riveted together until the circle at the bottom of the tank was completed. To lower this huge plate, 150 giant jackscrews were inserted at regular intervals throughout its area. The wooden supports were then removed. A man at each of the handles of the jackscrew awaited the signal to turn; a signal-man at the centre of the plate struck a piece of steel with a hammer, and at each stroke the 150 men made a half turn on the 150 jackscrews. The work of lowering was accomplished in 32 minutes.

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THE Blast Furnace, With Its Various Intricate Parts, is Something Not as Familiar to the Mechanical Trade as it Should be. "Furnaces, Like the Female Sex, Are Sometimes Hard to Handle."



Part II—The Blast Furnace

IT would be interesting to try and describe the evolution of the blast furnace; to describe the primitive furnace of Tubal Cain, the hole in the rock and the bellows of goat skin, but the task would be too long. Sufficient to say that the history of the blast furnace has been one of progress, small beginnings, gradual growth, based on experience and knowledge, and the end is not yet.

Let us consider first what makes up a complete furnace plant.

1st—Bins for storage of raw material, ore, limestone and coke.

2nd—Water supply for cooling purposes.

3rd—Blowing engines for blast air.

4th—Stoves for heating blast air.

5th—Furnace for actual melting or reduction purposes.

6th—Rolling stock, cars for raw material, ladles for cinder and hot metal.

7th—Mechanical appliances, hoisting engines, cranes, bell operating cylinders, mudguns, etc.

To discuss all these portions we must first have a knowledge of the various parts and their names. Fig. 1 gives a good idea of a modern furnace; all the important parts are numbered and the names generally used listed below:

1—Furnace foundation
2—Hearth or crucible bottom
3—Hearth jackets
4—Hearth
5—Bosh
6—Bosh bands
7—Bosh coolers
8—Mantle
9—Inwalls
10—Furnace shell
11—Stock hopper
12—Little bell
13—Stock distribution
14—Lower hopper
15—Large bell
16—Abrasion plates
17—Bell operating mechanism
18—Skip bridge
19—Skip car
20—Furnace columns
21—Hot blast main
22—Bustle pipe
23—Tuyere pipe or stock
24—Iron notch
25—Tuyere zone jacket
26—A frame furnace top
27—Gas outlet
28—Breeder pipe
29—Downcomer pipe
30—Stove
31—Cold blast main
32—Hot blast valve
33—Gas main
34.—Equalizing pipe.
35—Scale car
36—Cinder notch

The usual arrangement of plant is shown in Fig. II, but sometimes space causes stoves to be placed at an angle to the furnace.

The reader should endeavor to get firmly fixed in his mind the path of the gas and air by studying Fig. II and the following explanation.

The air is compressed to about 16 lbs. per sq. inch pressure by the blowing engines (6,000 cubic feet of air for each 100 lbs. of pig iron are about the usual requirements), passes along pipe A (cold blast main), is admitted by means of a cold blast valve to whichever stoves are "on air." Stoves will be described more fully later, for the present we can consider them as steel shells containing a checker work of brick, capable of receiving heat from gas and imparting heat to air.

The cold blast passes through the stove, is heated, passes out through the hot blast valve, along the hot blast main (B), to bustle pipe and furnace tuyeres.

While this is happening in say "A" stove, the gas passing from the top of the furnace through the downcomer, dust catcher, and gas main, C, is being burnt in, say, B and C stoves, the waste gases passing through the chimney valve to the stove draft stack.

It will be seen at once that, by the proper manipulation of the various valves, stoves can be changed from gas to air at will. The usual period is one hour on blast or air, three hours on gas; the temperature of the heated air is around 1,300 to 1,400 degrees Fahr.

It is, of course, understood that the skip car is used to convey stock to the furnace, which is admitted by means of the small and big bell.

Now that we have a general idea of what a blast furnace consists of, and the way the various portions are arranged, let us consider things more in detail.

First, look at Fig. 1, and notice how the furnace is built, the columns (20) support the mantle, (8), the mantle consists of a stiff circular girder, carrying not only the furnace shell and top gear, but all the brick lining above the mantle; in a modern furnace this weight is about 2,000 tons. Consider the responsibility of designing columns to carry this load and the necessity for good foundations under the columns.

The purpose of this construction is to allow the hearth and bosh to be relined without touching the inwalls.

The hearth jacket, (3), is an important item. Fig. 1 shows one form; a better construction consists of an inner cast iron jacket containing cooling pipes, and an outer steel jacket 2½ in. to 3 in. thick, riveted together and surrounded by steel bands, Fig. III.

The purpose of the hearth jacket is to prevent the liquid metal being forced out of the bath by the pressure inside. This sometimes happens and a stream of metal shoots out, cutting and destroying all and everything in its path.

The [illegible] deserves attention, for it is the business end of the outfit. It is usually located about 12 inches above the bottom of the hearth. It is one of the most simple parts of the furnace to make, consisting usually of a water cooling shell about 10 in. x

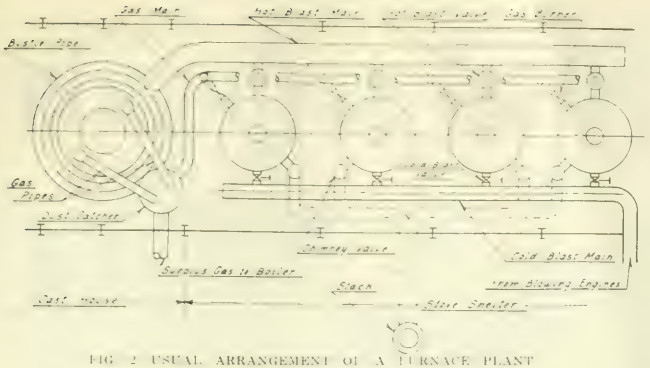


FIG. 2 USUAL ARRANGEMENT OF A FURNACE PLANT

6 in., open when pouring and closed at other times by forcing balls of clay into it by a machine called a mudgun. The clay, of course, soon burns into place and is as solid as the furnace lining.

In normal operation tapping takes place at four hour intervals, and is affected by drilling with a long rock drill and sledge; a dangerous job, and one demanding skill, strength, courage and care.

Some 4 ft. to 6 ft. above the iron notch are located the cylinder notches, (generally one on each side of the furnace). Now notice a peculiar thing; liquid iron will flow through clay or brick and will not affect it; cinder or slag will cut brick work quickly. Therefore, a metal opening must be provided for cinder, and to keep it from burning away it must be water cooled. The cinder notch is usually built up of three parts; monkey, intermediate cooler and cooler, (Fig. IV). The monkey is closed by means of a ball of clay.

Above the cinder notches we have the tuyeres; one of the most important parts of the furnace. Because of the heat of the blast the hot blast main, bustle pipe and tuyeres are all lined with fire brick, a beautiful piece of brickwork, for every joint must be fitted and close else the fierce cutting blast, with a temperature of 1,400 degrees Fahr., and a pressure of 16 lbs. per sq. in., will come in contact with the steel work and cut through it in a short time.

A modern 500-ton furnace has twelve tuyeres, equally spaced, (see Fig. V), notice the water-cooled portion extending into the furnace, the blow pipe, which often has to be renewed; notice how the elbow section, or boot leg, as it is called, can be swung back to allow of a quick change of blow pipe or cooler. The eye sight is closed by a piece of heavy glass or mica, and is used by the furnace operator to inspect the working of the metal. The portion of the furnace above the hearth and below the mantle is called the "bosh." The actual melting takes place in this region, and the brickwork is subjected to intense heat and abrasion. The usual construction consists of heavy steel bands spaced about 12 inches apart, and cooling plates inserted at frequent intervals to keep the brickwork from overheating.

Fig. VI shows a typical cooling plate; usually made of a brass mixture, sometimes the plates are set direct in the brickwork, sometimes in a cast iron housing, or box; the object of the housing is to facilitate renewal should a plate burn out.

Operating a furnace is a simple and routine proposition when all is going well, but furnaces are known to their keepers as members of the female sex, and they have all the beauties and uncertainties of that sex, and at times they do not go well. The iron notch cannot be opened, the cinder reaches the tuyeres, or the stock sticks, scaffolds and freezes, to say nothing of blow-outs and gas leaks. All these things call for a high degree of skill and intelligence on the part of the operator, for a false move on the part of someone may endanger a life and property.

Yet how strange that this fascinating field is neglected by college trained men; often because it means a few years of hard toil before reaching a position where they can employ their technical training.

To stand in front of a furnace pouring is a wonderful sight. To see the cinder notch opened and watch the tons of slag drained to the huge ladle; to see the preparations for casting pigs in the floor of the cast house, or the less picturesque operation of pouring through the iron runners to the iron ladles, is a sight, which, if witnessed for the first

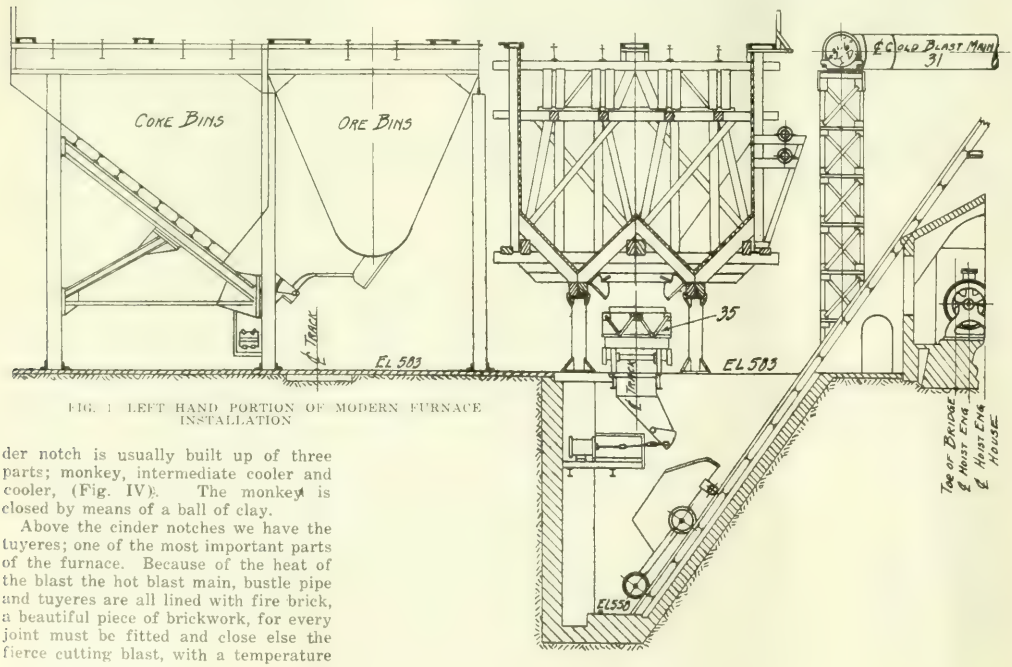


FIG. 1 LEFT HAND PORTION OF MODERN FURNACE INSTALLATION

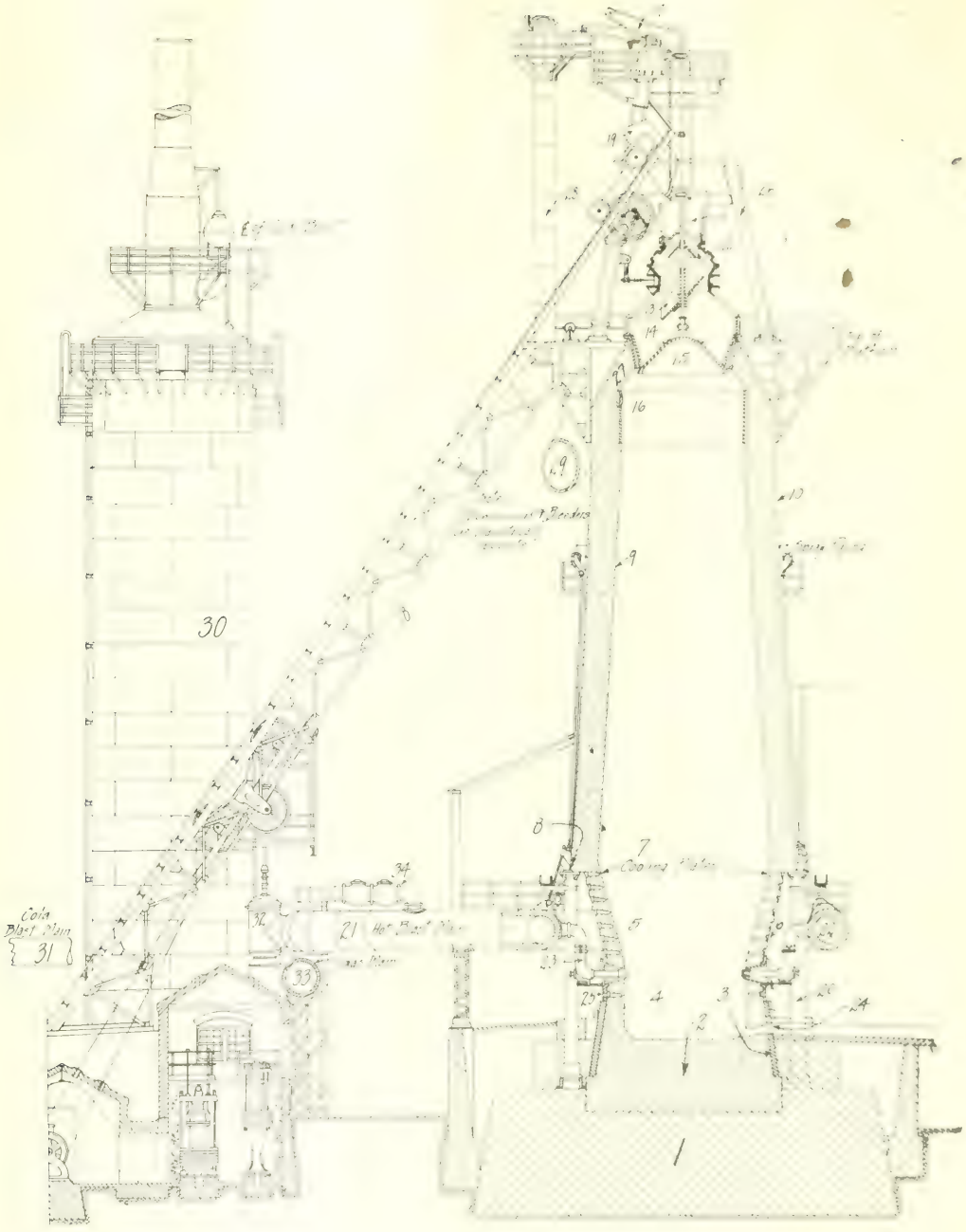


FIG. 1—SECTIONAL VIEW OF MODERN FURNACE EXCAVATION

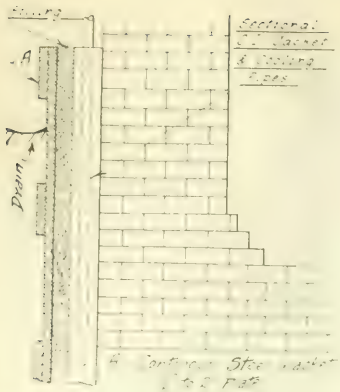


FIG. 3—HEARTH JACKET.

time at night, will never be forgotten.

I remember two brothers who worked at a steel plant; they often talked of their work at home, and their mother, who listened, formed a vague idea of the operations she had never seen. One evening she was persuaded to visit the plant, she saw the mills, the huge revolving fly wheels and rolls, they visited the open hearth and saw 100-ton furnaces roll over and pour out their contents; they reached the blast furnace just as pouring commenced; the younger brother pointed out the pouring stream, with its scintillating sparks, with pride. Mother grasped his arm; "John," she whispered, "where do we go when the blamed thing starts to go round?"

But let us return to our furnace. The brickwork above the mantle is often protected by cooling plates or pipes. The furnace shown in Fig. 1 is cooled by a spray on the outside of the shell. This is not a successful method in cold climates, or where high winds are encountered.

The steel shell is of heavy plate work, ½ in. to ¾ in. plates, for as the lining wears hot spots appear on the steel work. At the stock line, or throat of the furnace, cast iron abrasion plates are inserted to prevent wear to the brick work.

The brick lining deserves a few words. At the bottom of the hearth the pressure is the greatest, and the temperature is about 3,000 degrees Fahr. Large blocks are employed here. They are of high grade fire clay, laid with a thin joint and fitted by rubbing down with carborundum stone. All joints are carefully staggered, for a leak here would be fatal. In the bosh the temperature is higher, 3,200 degrees Fahr. to 3,500 degrees Fahr., and brickwork of very highest grade must be employed. From the mantle up the temperature drops to 500 degrees Fahr. at the stock line, and second class bricks can be accepted about half way up the inwalls.

Notice the thickness of brickwork, 3 ft., 0 in., to 3 ft., 6 in., insuring a body of material to hold the heat and stand the abrasion of a long campaign. Thin wall furnaces have been unsuccessful, mainly because an excessive amount of water cooling was required, and it is just as bad for a furnace to be too cold as too hot.

The furnace top is a source of contention among blast furnace engineers; history for just a minute, please. All furnaces were at first filled by hand, men or women, carts, wheelbarrows or baskets, and the ore, lime and coke could be distributed just as the superintendent of the furnace desired. If one side of the furnace was cold additional coke could be fed to that side; if hot, vice versa. With the first mechanical tops this could not be done and many operators were dissatisfied. Patent tops with distributors were developed by

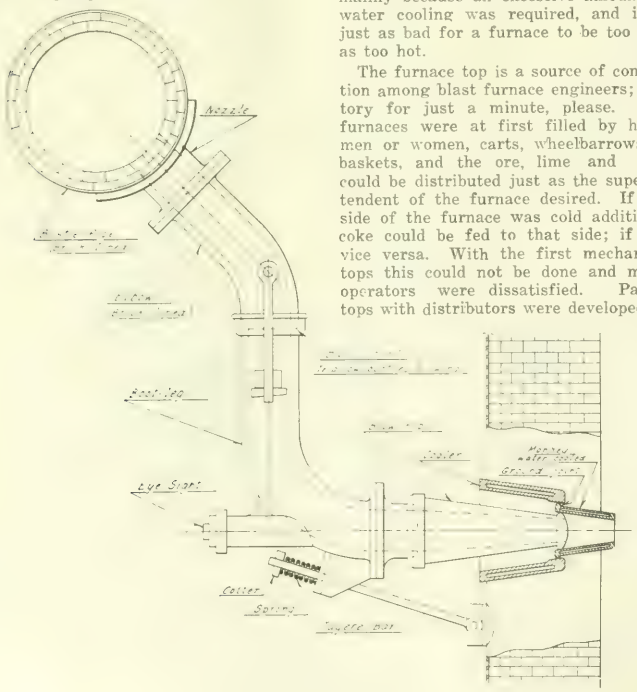


FIG. 5—TUYURE STOCK.

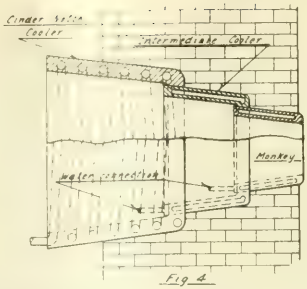


FIG. 4—CINDER COOLER.

the score, some worked, many did not, often because the inventor forgot that a blast furnace top is at the best a dirty, hot, mechanical rocking place, where springs, cams and gears have only a short life, where adjustments cannot be maintained and the hammer often the favorite tool in more senses than one.

Let us consider what we must have on a furnace top.

1st—A support for the sheaves of the skip car rope.

2nd—A hopper into which the skip car can dump.

3rd—A bell to admit the charge to the inner hopper.

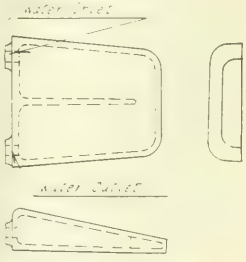


FIG. 6—BOSH COOLERS.

4th—A bell to admit the charge to the furnace.

5th—Mechanism for operating the bells.

The two bells are, of course, to prevent the escape of gas each time a charge is admitted into the furnace. One bad accident to a furnace is to drop or lose a large bell. Fig. 1 shows all these parts very clearly with the addition of a simple distributor, that in part meets the demands, but there is room for much engineering skill on a furnace top yet.

At the furnace top is also located the gas outlets. The modern way is to arrange two to four outlets, as shown in Fig. VII, the ascending gas carried with it many particles of fine dust, coke or ore; especially when small or large explosions occur, the valve at the top takes care of explosions, acting as a safety valve, the long riser gives the heavy dust a chance to fall back to the furnace, so that the gas going to the dust catcher is fairly free from large particles of dirt.

Dust catchers take many forms, but

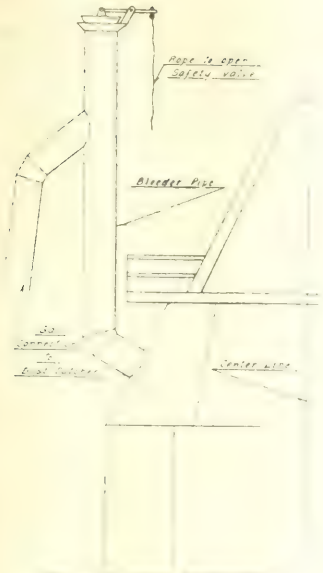


FIG. 7 BLEEDER CONNECTION

are mainly based on the principle that if the velocity of the gas is lowered [illegible]

Skip engines are steam or electric driven. Absolute freedom from breakdowns is more important than absolute economy.

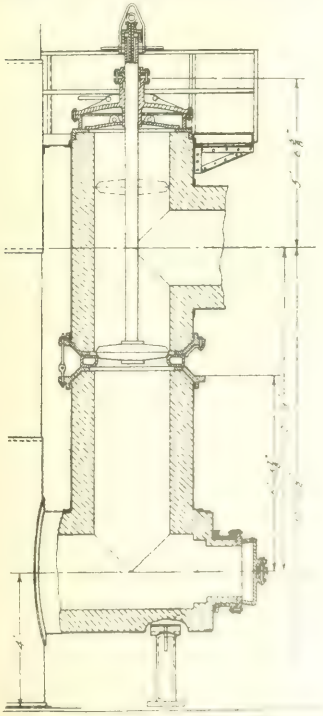


FIG. [illegible] TOP PLA[illegible]

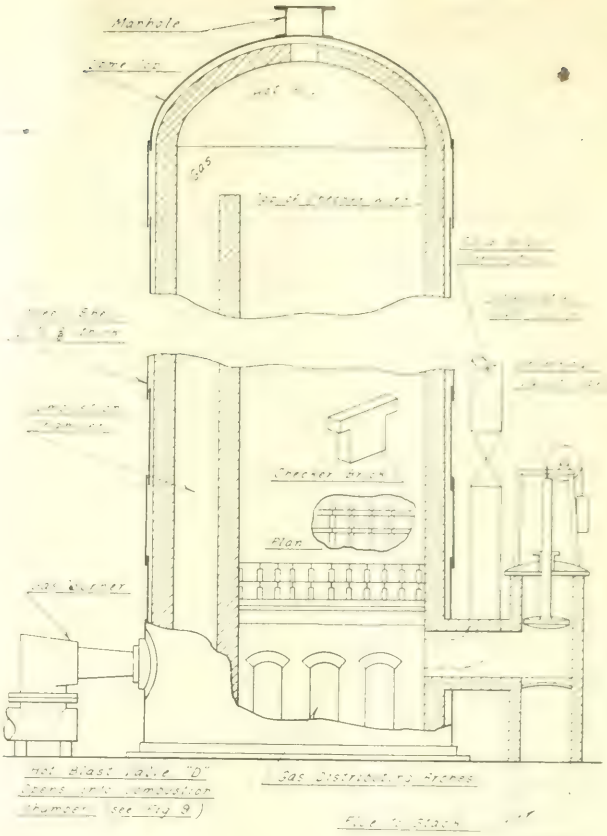


FIG. [illegible] SECTION OF A STOVE.

Bells are lifted by steam cylinders or electric hoist; dependability again being the chief feature desired.

Now let us consider the stoves more in detail. There are shown two main classes, those that have the draft stack on top as shown in Fig I, and those that have a common stack for all four stoves and separate from any of them as shown in Fig. II. Most Canadian plants favor the latter design. A section of a stove is given in Fig. VIII.

Just at this point we cannot resist going into history for a few minutes. Away back in 1825 James Neilson started using preheated air for furnace blast. The saving was so pronounced, even with low temperatures, that he patented the idea and several forms of stoves, but [illegible] even as to-day, and a combine of Scotch furnace owners, anxious to save a few pence in royalties, took a pledge to break the patent by any means, legal or otherwise. The fight was long and bitter, but in the end the pence-saving Scotch lost the day.

[illegible] set in brick chambers, and if the temperature exceeded 700 or 800 degrees Fahr. the life of the tubes was very short. In many cass the stove was located on top of the furnace.

Referring to Fig. VIII, this stove is known as a two-pass stove, the gases passing up and down before going to the chimney flue. Other designs have three or four passes, but many passes often cause trouble with blocked passages, etc.

The gas from the furnace top is burnt by a special burner at A. The products of combustion pass up the combustion chamber, down through the many openings in the checker work, heating the whole mass of brickwork on the way, finally the waste gases pass out by way of the chimney valve B. The draft of the stack is, of course, the actuating force.

[illegible] doors closed, chimney valve closed and cold blast valve, C, and hot blast valve, D [illegible] for furnace operation.

Notice the hot blast valve in Fig. 9, [illegible] so as to be easily removed, [illegible] and stem are water cooled, and every

part is brick lined; this is indicative of all blast furnace work; heat to be resisted and yet working parts arranged just the same.

Furnaces are rated by their production per day of twenty-four hours. Their heights are for the most part the same, 70 ft. to 85 ft., if made higher the weight of stock would crush itself; if lower the top temperature would be too high, and there would not be space for the various changes. The diameter of hearth, therefore, controls the size. Roughly, a furnace having a 13 ft., 0 in. diameter hearth will produce 250 tons per day. A furnace having a 16 ft., 6 in. diameter hearth will produce 500 tons per day.

To produce 500 tons of metal, 1,000 tons of ore, 1,200 tons of coke, 500 tons of limestone and 3,100 tons of air must be handled.

We have covered a big field in a short time. Study the illustrations and reason out the why of the various parts and more information will be obtained than by mere reading.

Our next subject will be "Operation and simple chemistry of the blast furnace."

Some Hints on the Care of Pneumatic Tools

A Talk on the Various Conditions Under Which Pneumatic Tools Are Used, with Suggestions as How Best to Meet These Conditions

By A. W. SWAN

THERE are few modern machines of such importance, considering weight and size, as the pneumatic tool, more particularly in connection with shipbuilding. Considering the conditions under which the average pneumatic tool is operated, in all temperatures, exposed to unfavorable weather conditions in outdoor work, or in dusty surroundings in machine shop and foundry, it is not surprising that care of the tool is well repaid by increased work and longer life.

In the first place, whatever the tool, riveter, grinder, chipper, drill, etc., the air supplied must be as clean and dry as possible.

The cleanliness of the air can be assured by having the intake for the compressor suitably placed; the dryness depends also on the compressor. In two-stage air compression, a large percentage of the moisture contained in the air is removed by a moisture trap in the intercooler. For large installations, it is well worth while to supplement the intercooler moisture trap by an aftercooler, in which the air is again cooled after the final compression, and still moisture removed. The Hog Island Shipyard compressed air installation is the second largest in the world; all the air is compressed in large two-stage machines, and passed through aftercoolers.

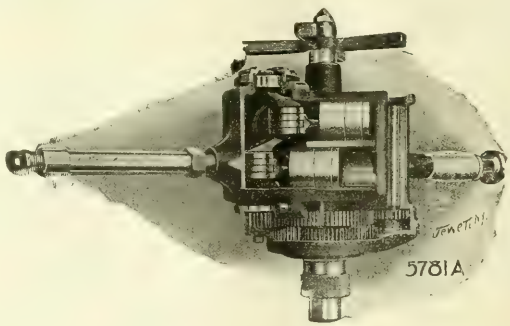
The main difficulty due to moist air comes in cold weather; air exhausting from pneumatic tools is very cold in any case, due to expansion, and the cooler the air the less moisture will it hold, the result being that in cold weather the exhaust of the tool rapidly becomes clogged with ice deposited from the air, unless means are taken to prevent this happening. Still another preventive is to have a reheater in which the air is heated just before reaching the tool; the air is then too warm to deposit the moisture in the form of ice, and the reheater has the further advantage of expanding the air, increasing the supply to the tool. It seems at first rather absurd to cool the air after leaving the compressor only to heat it before reaching the tool; the point is that the air would cool anyway, and it is better to catch the moisture in the aftercooler trap, than to have it deposited in the pipe line. Marble cutters who use the small carving pneumatic tools sometimes in the winter put a lubricator filled with alcohol on the discharge line and allow it to feed with the air and this prevents freezing, but the quantity has to be carefully gauged.

Good lubrication is the secret of good performance for pneumatic tools as for other machines. Riveters, chippers, and other reciprocating tools require a light bodied oil of high grade, and should be oiled three or four times a day. Drills, etc., should be packed with a grease that is not too light—if it is too light it will cause heating—and do not require attention so often as riveters and chippers. They should, however, be turned over frequently to allow the grease to reach all working parts. Grinders, close corner drills, etc., sometimes use 600 w. steam cylinder oil with excellent results on a mixture of grease and 600 oil.

Pneumatic tools of all kinds should be cleaned once a week. Riveters, etc., should be taken apart and cleaned in a bath of kerosene. For drills and grinders it is sufficient to pour in kerosene, run the machine light for a few minutes, drain out the kerosene, and fill with grease.

In case of trouble with valves, etc. the less tinkering the better. The pneumatic tool is made up of parts of selected material, generally high grade steel, heat-treated and ground to close limits, and a very little filing will usually do a great deal of harm. For the same reason home-made substitutes for parts that need replacement are decidedly false economy.

In cold weather on outside work, a useful tip is to warm the tool slightly before starting work.



SECTIONAL VIEW OF PNEUMATIC TOOL.

ASSOCIATION OF BRITISH MOTOR AND ALLIED MANUFACTURERS

The above is the title of a new corporation which has been formed to promote and develop the British overseas motor trade. This body, in conjunction with the Overseas Trade Department of the British Government, has already sent one expert on overseas commerce as a commissioner on a tour of investigation into the Eastern markets. The principle of co-operation thus established between the manufacturing concerns and a Government department is expected to have lasting effects on the conduct of the trade. Inside knowledge of the conditions and requirements of foreign markets will now be forthcoming firsthand from reliable sources, enabling firms to adopt the right methods of business for particular lines.

British firms are watching closely the steps that United States makers are taking for setting up branch works in Canada in order to be able to avail themselves of the favorable terms of a preferential tariff when it becomes definitely established.

Canadian Machinery Drafting Course—Part VII

In Which We Enter the Subject of Orthographic Projection, Studying Various Simple Objects to be Found in General Working Practice—Students Will Do Well to Carefully Follow This Section

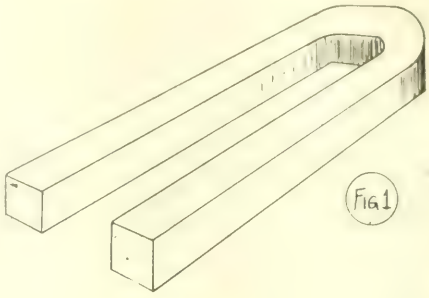
By J. H. MOORE, Associate Editor Canadian Machinery

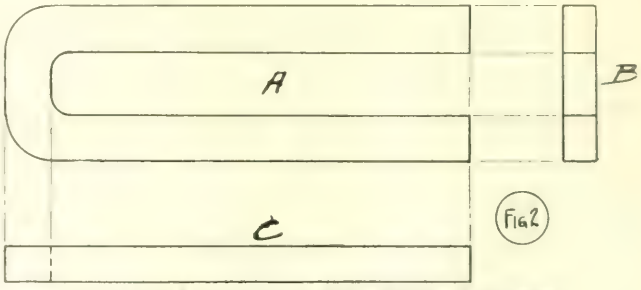
THE subject of projection drawing (or orthographic projection as it should be properly termed) is one of very vital importance, and one which, to make a success of this course, must be given fairly good space and treatment. In order to make the same interesting to the students in general, we will use (as far as possible) objects with which the machine apprentice is entirely familiar. In this way the subject becomes more interesting, and the fact that the machine apprentice knows from actual experience that such objects really exist, guarantees that the apprentice in the drafting room will likewise be well aware of their existence. Perhaps a good heading to begin with would be the statement as follows:

The Representation of Objects

In Fig. 1 we will illustrate a clamp of the usual nature found in most machine shops. Its uses are varied, as far as the various styles of machines used on, but as is well known, its main function is to clamp. This object is drawn as it actually appears when the eye of the observer is in some certain position. As can be well understood, this sketch at Fig. 1 does not show the true length of the various lines, in fact this sketch is simply known as a perspective drawing. Such a sketch is of no practical value to the machinist or tool maker, except to show what the object looks like. Of course, on a simple piece, such as this illustrated, one could easily work from the same if dimensions be placed on it, but without dimensions is is useless as an actual working drawing, for in no way can you measure the true length of the lines.

In order to represent this object in such a manner that any line can be measured directly we employ the method called projection drawing. In a perspective drawing various sides are shown but in a projection drawing only one side is shown at a time, the others being hidden.





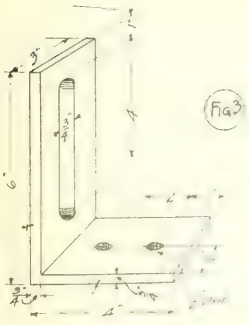
FIGS. 1 AND 2. ILLUSTRATING THE TWO STYLES OF DRAWING

Let us illustrate this point by referring to Fig. 2, which shows the same clamp drawn up by the projection method. First let us consider the view A. This view is what is termed a top view, or plan view, namely a drawing which represents the object as if it were resting on a horizontal plane, and the observer looking at it from above.

But from this view we get no idea how thick this clamp is, and if the slot runs clear through its thickness. In other words we must have a front view, or front elevation. To get a complete idea of the side appearance of the clamp we need a side view of side elevation, [illegible] B of Fig. 2, where we see the front elevation, that is the view drawn by imagining [illegible] server looks directly at the front of the object.

The result is clearly shown.

The side elevation is now drawn, as [illegible] look like that shown at C.



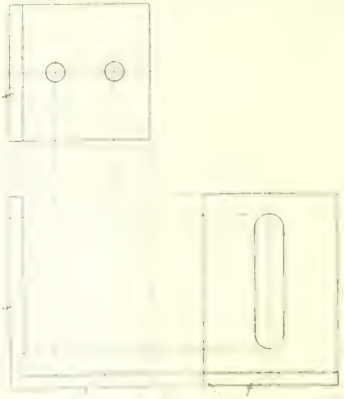
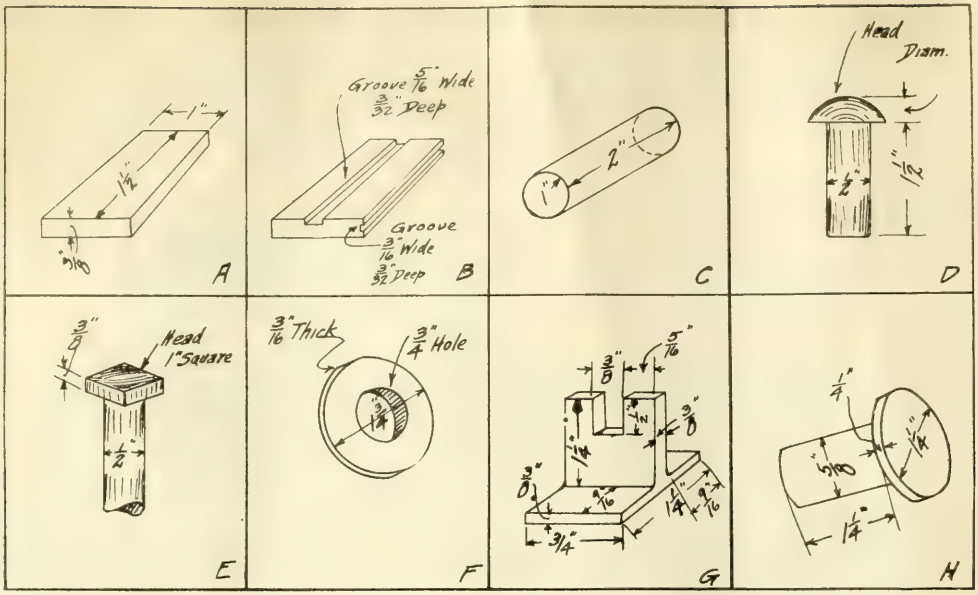


FIG. [illegible] OF DRAWING.



ILLUSTRATIVE SKETCHES A TO H.

Illustrates another well known object, namely an angle plate. To illustrate the principle clearly we give dimensions on the perspective sketch, from which we will proceed to make a projection drawing.

Starting at the plan we draw the view shown at A. We next project the two elevations as illustrated. It is a matter of taste which of these three views you start on, for it makes no difference which is drawn first, but the general arrangement is always as shown.

Any departure from this standard arrangement should be guarded against, but should for some reason or other, the draughtsman decide to change the relation of these views, he should state clearly on his drawing the change made and why.

The broken centre lines are used to show the connection existing between the different views of the object, and to indicate axis of cylindrical surfaces of any kind, but as the best method of following out a subject of this nature is by an actual study of the objects, let us go on to discuss plate No. 7.

As per usual, 9x13 in. is to be the actual drawing size, and 9½x13½ in. the trimming sizes. Preserve the 1 in. space at the bottom for title purposes as usual.

To aid the student we illustrate a chart at Fig. 4, showing rough sketches of the various objects about to be discussed for projection drawing on this plate.

A the first object, represents a tool steel blank 1½ in. long, 1 in. wide and ¼ in. thick. B represents this same piece after a groove has been cut on two of its sides as shown, these grooves being 5-16 in. wide on top, and 3-16 in. wide on side, each being 3-32 in. deep.

At C is illustrated a cylindrical piece of tool steel, while D represents a rivet of the round button head type. E shows a square head bolt, while F represents a round washer, numbers of which can always be seen around a machine shop, of all thicknesses.

In each case dimensions are given, so that to transfer from the perspective to projection becomes an easy matter.

Students will notice that for the objects C. D. E and F. only two views are given. The reason for this is no doubt self apparent, namely that were we to draw a third view of these pieces, it would be simply a repeat of the side elevation, for the pieces being round, the front and side elevations are similar. This, of course, does not always apply, for in the more difficult cases of projection more views than even the three

HERE ARE THE PRIZE WINNERS FOR PLATE No. 3.

1st—Carl Rowson, Port Hope, Canada.
2nd—Ernest Bell, Amherst, N.S., Canada.
3rd—H. Luxon, Hamilton, Canada.

Is your name here? If not it may be next week, so keep on sending us your work.

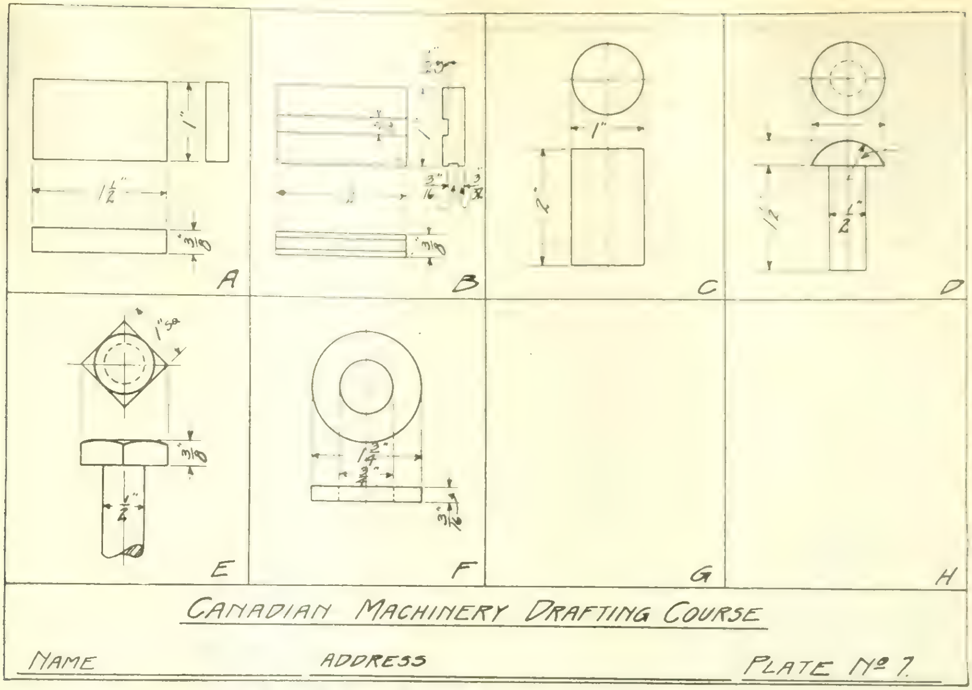
Tear off and send with drawing

Name .....

Address .....

Position .....

Firm's name.....



HERE IS PLATE NO. 7. BE SURE AND FILL IN THE SPACES G AND H

already spoken of are required, owing to the intricate nature of the object, but as this is really a more advanced subject, we will keep for the present to the three views, or two as the case may be.

We have divided this plate No. 7 into 8 parts as shown, leaving the last two spaces vacant, for a good reason.

In order to make sure that students have grasped the principle of projection, we have illustrated on Fig. 4 two objects G and H. These objects are well known, namely, first G is a small, simple bracket from a machine. All dimensions are plainly marked. H represents a flanged piece of work, usually made up in most machine shops for various types of work.

Now, the object is as follows: Study these sketches carefully, then draw up your idea of what a projection drawing of these pieces would look like.

Put all dimensions on the various views on this plate, and use the illustration of plate No. 7 as shown with this article for a guide. Above all stick to it, and send us your work. True, the weather is good, almost too good [illegible] perhaps, but think a moment, for by following up this course you are building up something which will bring you returns at some future date well worth the present sacrifice.

Auto scooters, which are undoubtedly going to become very popular, are still on the imports prohibition list, and several firms are busy [illegible] take full advantage of the protected period.

WILL THE FORMER CONDITIONS EXIST

The modern manufacturing methods installed for production in the national interest, the specialization, repetition and standardization called into being are going to persist. These all involve a greater expenditure on mechanism relative to the number of operatives, the cost of the product falling as methods are made more intensive and expenditure on machines goes up. Materials, semi-manufactured, which form the basis of the industry, will remain high in price for a very long period; the total production will be insufficient to fill demand for years. The maker of mechanism competes for material in the same market as the shipbuilder and railroad. The price of the material in a lathe is directly affected by the demand for steel rails, boiler plates and section material, of which not merely this country, but the entire world are in sore need both now and for the coming decade. Agriculture, again, will use more and more mechanical devices. The productivity of Mother Earth, both on and below the surface, is the great [illegible] comfort, and to get maximum results at the lowest cost means the intensive application of mechanical art.

[illegible] "crash of peace" in the way of slump elsewhere, it is certain that it will not [illegible] very long time. Hence high prices of material and product will rule for an indefinite period. As labor costs are in [illegible] if prices gradually descend it will be due to greater individual productivity. This is where better methods of organization, standardization and specialization and the due application of scientific methods of production may help equate the advanced prices of material. We are now in a period when adulteration, so far from being a matter of reproach, is a patriotic necessity. Former standards of material cannot be maintained, for it it needful to spin out a fixed quantity of any commodity by admixture with a substitute of less value, or even to use the substitute in defiance of former prejudice. The use of the cheaper material or one of inferior quality has not in the majority of instances been attended with any disastrous result; indeed, the contrary has in many instances been the case. Standards have had to be lowered by necessity, and there will be a clear gain in price by retention of the substitute where this is suitable. Doubtless, there would have been evolutionary substitution, but the war has hastened such alteration by many years. Again, work- [illegible] in character for the use, and cutting out [illegible] costs. It might have come without the [illegible] ous wastage. The former will persist [illegible] may and will help to limit the rise in price.



WHAT OUR READERS THINK AND DO

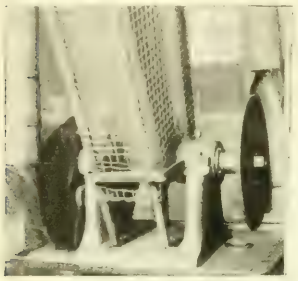


A FULL ANTI-FRICTION GRINDER

By DONALD A. HAMPSON

The grinder shown by the photograph is a home-made one, but is right up-to-date. It is fully equipped with anti-friction bearings. The head casting is a stock part in the shop where the grinder is used and its size lent readily to the desired sizes of bearings selected.

The boxes were bored out to receive the linings of a pair of Hyatt 1¼ in. roller bearings, 4 in. long. Dust caps



HOME MADE DISC GRINDER.

will be seen at the ends of the boxes. Within these, in addition to the usual felt washers, there are ball thrust bearings of generous size. Provision is made to take up end play by the use of washers, if it ever becomes necessary.

On one side of the grinder, the snagging of castings is done on a 14 in. Norton wheel. On the other side various sizes of disk wheels using carborundum cloth circles are carried. Disking naturally puts considerable end thrust on a grinder and here the anti-friction qualities of the ball bearings show to best advantage.

They say in the shop that this grinder runs itself; it takes three full minutes for it to stop after the belt is shifted off. And what is more to the point, two men working on the machine don't stop it now as they used to with plain bearings.

An interesting feature is the way the disks are screwed on. They slip a ball thrust bearing on the shaft against the flange and tighten the disk against this. No wrench is required for loosening—the workman takes hold of the disk with his hand and gives it a turn and it loosens itself. The thrust bearing seems to keep the disk tight without wedging it fast.

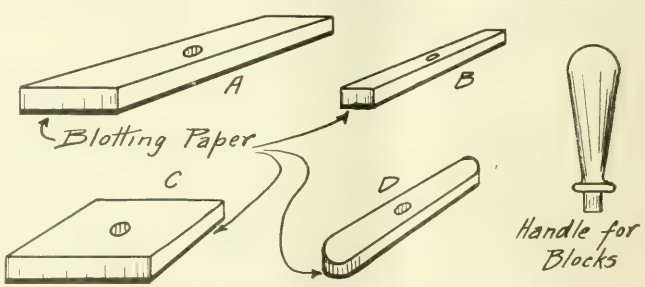
MAKING CORRECTIONS ON BLUE-PRINTS

By Harrison Jenkins

Readers no doubt at some time or other have required to make some corrections on blueprints, and perhaps went through the laborious task of first blotting out the dimension in black with pen and ink before adding in the new figures. This scheme has two disadvantages: first the time necessary to blacken in the figures not desired, and second, that you cannot very well place the dimension in its former position, except you write the correction in white ink (which is not always easy to get). If white ink is not to be had, then it means that you must crowd in the figures somewhere else, not always a wise plan to follow.

An easy way to overcome all such trouble is to make little blocks of such length and width as best suits your usual needs. Four such blocks more than likely will cover all the changes you will ever desire. Glue (or hold by thumb tacks) pieces of blotting paper as shown.

Simply moisten these pads with the usual bleaching solutions of washing soda, caustic potash, or strong ammonia, in fact any alkali, and press the pad on your blueprint, when you will not only accomplish a quick job, but will make a neat white space in which you will be able to print in black ink your desired correction.



SKETCH SHOWING THE BLOCKS.

MAKING CASTINGS FROM MIXED COPPER ALLOYS SWARF

In dealing with finely divided metal, the first thing is to pass it through a magnetic machine to remove iron, and preferably the next thing should be to mix in about 5 per cent. in bulk—net weight—of hardwood charcoal, granulated to the size of large peas, dust not being wanted. Large crucibles should be used for melting, a few pounds of brass or gun-metal being melted before the swarf is put in, it being desirable to have a small bath of molten metal to start with. The swarf should be added to the bath of metal in moderate quantities until the crucible is full of metal to within 2 in. of the top, when, if possible, the crucible should be lifted and skimmed into an iron scoop, and then replaced in the fire, the dirt taken off being placed in a brick or metal bin and saved for further treatment. When in the fire again the metal should have salammoniac well stirred in at the rate of from 2 oz. to 4 oz. per 100 lb. of metal—a small excess does no harm—and when the fumes cease to come from the metal the crucible should be lifted, well skimmed, and be poured into the moulds, but on no account may it be stirred at this stage. Clean castings should be secured that will turn up without blemish in this way, the castings having a clear brownish skin when cold. If too hard, the castings should be taken from the moulds while red hot and plunged into cold water, this annealing and softening them so that they machine readily. So far as possible, copper-tin and copper-zinc alloys should be kept separate, and phosphor bronze should be kept out of brass mixtures while aluminum should be kept out of both, this metal causing pin holes under the skin except in a few of the copper zinc mixtures and phosphorus often has the same effect where zinc is present. Where ferro-bronze is used the scrap should always be separately collected, as the iron does not fit in well with miscellaneous scrap as a general thing, and manganese bronze should be kept separate where possible for the same reason.—

A Discussion on the Subject of Jigs and Fixtures

Can a More Accurate Tool or Fixture be Produced by Using Approximate Measurements, Than by Using Strictly Precision Methods—This Article Discusses Various Questions on Jig Fixture Design

By WILLIAM ERNEST

WHEN one starts to speak of jigs and fixtures, he might begin alright, but he can hardly be expected to finish his subject; its ranges are almost without limit. A too common error among toolmakers is the notion that a jig is essentially a very fine piece of work. Of course, jig and fixture work can be carried to very fine limits if necessary, but on the other hand, a large percentage of jigs for drilling need be no closer than an ordinary mechanic can lay out with dividers and centre punch.

The object of these tools is to produce an article with unskilled help in the least possible time, as good as a practical mechanic would without their aid. Therefore, it would be wise for the tool designer and the toolmaker to be governed by the circumstances incident to the job in hand. In so doing a more accurate tool can ofttimes be produced by using approximate measurements than by using strictly precision methods.

This may appear to be a paradoxical statement, but the following illustration will suit to prove its feasibility. Suppose, for instance, we have to make a jig to drill a hole in the centre of a drop forging, which is just a plain round piece, say, for instance, one inch in diameter, and we have only the blueprint of the piece to make our jig by.

The drawing, of course, will give the dimensions of the forged piece and the toolmaker is expected to make a jig to produce a hole in the centre of any number of pieces. Whilst forged articles are all practically the same, a glance at a few forgings will be sufficient to convince anyone that any attempt at precision methods on such a job is just waste of time. To sum up, it can almost be reduced to the following rule: One hole in an unfinished article can be no more accurate than the rough surface, and each subsequent hole can only be accurate in relation to the centre of the first. So it can readily be seen that if a mean between all the conditions surrounding this particular job are taken into consideration, such as burrs, lumps, fins, scale, flat spots, draft, etc. What is needed is more common sense and intelligent application, instead of precision.

Now let us consider another type of jig, which is very common to many branches of the metal working industry. We [illegible] drilling holes in a circle equally spaced, such as are in flanges, hubs, etc. To illustrate the best way to tackle such a job, we cannot do better than cite an instance which actually occurred, thereby proving the easiest method, as well as showing how mechanical commonsense wins out. Such sense can readily be acquired by reading trade journals, thereby gaining a broad view of all conditions relative to one's line of business.

Just for a moment or two imagine yourself to be the boss of the toolroom and are handing out the work in the instance I refer to.

Two jigs are required for drilling six holes in a circle in some rough malleable iron flanges. The holes are for ordinary ⅜ finished bolts and a 25-64 drill is used to give sufficient clearance. As the boss with the foregoing facts to guide you, you hand out a job to Jack and Bill. Bill is one of those chaps that is always blowing about accuracy, so you merely give him the blueprint of the article and tell him to make a jig. Jack being a reasoning and practical sort of fellow, asks just what is the job for, etc. and is told all that is required is for the bolts to go in through the flange and then through wood, and then to be drawn up with a washer and a nut.

Now, let us watch these two lads start work on their respective jobs. Let us assume it is first thing Monday morning. Of course, everyone feels good and fresh after Sunday's rest up, and our nervy men feel like chewing up anything from brass to high speed steel; both are now well on their way laying out their jig plates, and by 7.30 Jack has his laid out and Bill is still fussing around with jig buttons. It's amusing to watch Bill work. As I said before, they both feel like tearing things up. Bill forthwith starts to give good proof of this fact by busting a jig button up in his jig plate.

It is now 8 o'clock and Jack is sitting on a stool at the drill press with his tongue out, eagerly trying to spit the centre punch prick on his plate, while Bill holds forth like a Bolshevik orator concerning the way this 'ere shop runs. Jack, being of a humorous turn of mind this morning, feels the little grin devils hammering at his slats, urging him to laugh at the thought of the precise methods Bill will have to use to get that little tap out.

However, in due course both are nearly working again with hopeful prospects. Bill is now actually in the lathe carefully boring out his job and feeling real pleased with himself. Nothing else unusual happens till dinner time and after a good meal both return to the shop a little before the whistle blows feeling like giants filled with new wine. In this frame of mind Bill commands the attention of a novel noonday audience and creates quite an impression upon some concerning the wonderful refinements of modern mechanics.

As soon as the shop gets fairly started again, Jack gets his jig bushes made and his rival begins to sit up and take notice. The usual little finishing touches, such as pressing in bushings, lapping the same and generally humoring things into working condition, occupies Jack's time till next morning at 11.30, when he turns in the job, fit for a king. On the other hand, Bill is still fussing around with his accurate methods and even if he gets his job as accurate as he intends to, it will not do a better job. To be brief, it took Bill just 10 hours longer to produce the same results as Jack. It might be argued that Bill's job was the most accurate, which fact is granted concerning the jig itself, but it must be remembered that tools are only a means to an end, which in this case means drilled flanges good enough for practical purposes. We could hold forth about jigs and fixtures until Doomsday, and the half will never be told. Trusting we have all learned a little from Bill and Jack, we will leave it for some of their contemporaries to tell us more.

TRACING BY ARTIFICIAL LIGHT

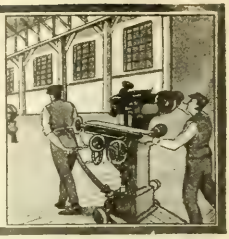
By Harrison Jenkins

The writer, in his experience in the drafting business, had to resort on one occasion to artificial light for an aid in tracing, and a brief description of this experience might not be amiss.

A certain drawing was handed to the writer with the instructions: "Trace that." "That" happened to be a dirty, much-oiled and handled paper drawing. I could hear the words still ringing clearly, "Trace that," so I got to work, but it was slow sledding. So slow, in fact, that I stopped and rigged up the following scheme: I took a blue print frame we had and placed the drawing firmly on the glass, then pasted it to the glass all around the edges. I now turned the frame over and placed a piece of tracing cloth on the other side of the glass, fastening this in like manner. I next set the frame on the desk in such a manner that I was able to place a good, strong light directly behind the drawing, when by the transmitted light I could then easily trace with more speed and [illegible]



DEVELOPMENTS IN SHOP EQUIPMENT

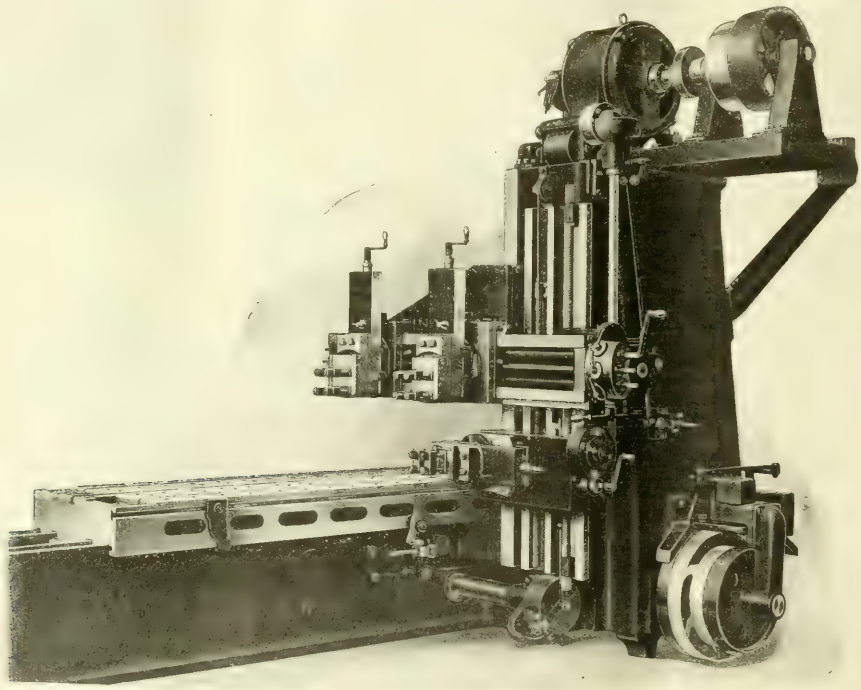


Cincinnati Open-Side Planing Machines

In This Article Is Described a New Product in So Far as the Cincinnati Planer Co. Is Concerned, for This Firm Has Formerly Confined Itself to Planing Machinery of the Double Housing Type.

THE Cincinnati Planer Co., Cincinnati, Ohio, have recently placed on the market a new and complete line of open-side planing machines. This is a new departure for this concern, and it is stated that the best of care has been exercised in the design of these machines, to embody all the features of the double housing type.

The machines are manufactured in three sizes, 36 x 36 in., 48 x 48 in., and 72 x 72 in. The points of superiority cited are power rapid traverse for the rail heads, a box-type table, forced lubrication of the Vs, a patent "two speed" drive on the 36-in. and 48-inch machines, quick-reverse aluminum pulleys, an extra capacity table, a box-type bed closed on top, a bed bored for shaft bearings by means of jigs, a bull wheel revolving with the shaft in bearings at the side, bronze bushed self-oiling loose pulleys, a self-releasing combination friction, patent gear-shaped tumbler and dogs, a safety locking device, a down-feed screw and collar of one-piece construction, ball bearings on the down-feed screws, down-feed screws in tension at all times, adjustable taper gibs throughout, a vertical slide maintaining a full bearing on the harp at all times, micrometer collars for horizontal and vertical feeds, simplex feed gears, a patent power-elevating device, and all gearing completely covered. The side head has a long narrow guide for the saddle on the column; an independent adjustable-feed gear, and a handle for the vertical movement; a self-contained counterbalance system, and a releasing latch handle for the tool block.



GENERAL VIEW OF [illegible] MACHINE

The rail heads are provided with a

rapid power traverse mechanism.

The Vs of the bed and table are oiled by force lubrication from a pump which delivers the oil into the Vs directly under the tool point, and from this point it is distributed over the entire length of the bed to either end, from where it returns to the tank, the oil passing through two strainers before it is again used. For planing work that is wider than the table, the use of an auxiliary rolling table is recommended, this being supplied at extra cost if desired. The 36-in. and 48-in. machines are regularly furnished with a "two-speed" drive, giving two cutting speeds and a constant speed return, but where a greater number of speeds are needed either reversible or non-reversible motor drive is furnished, these requiring direct current.

The Bed

The bed is of heavy-box section, and is especially strengthened where the gearing and column are mounted. Heavy T-shaped girths at short intervals tie the walls together, and further strength is added by closing in the top between the Vs with an integral part of the casting. The column seat is deep and wide, providing a large surface for the column fastening, and is entirely inclosed on all sides. The length of the bed has very little overhang of the table when planing at full stroke.

The column is of box-type construction [illegible] to the bed by tongues and grooves in addition to the regular bolts and dowel pins. It is made with considerable taper toward the bottom.

The Table

The table is of the box type, the bottom being entirely closed. Heavy ribs at short intervals tie the top and bottom securely together, and prevent springing either when clamping work upon it or while it is at the limit of its travel. The T-slots are planed from the solid (not cored), the centre slot extending the full length of the table. Stop holes are drilled and reamed throughout the entire surface of the table. By drilling extra holes at each corner of the table and by carrying the centre T-slot the entire length, it is possible to plane from 6 to 10 in. longer than the rated capacity of the machine. Making the under side of the table solid also prevents dirt and chips from falling through the holes into the ways. Each section of the rack is bolted and doweled to the table.

The gearing and rack are cut from the solid by a system of special cutters for each gear, this method giving a smooth-running machine, and insuring strength and long life. All the large gears and racks are made from semi-steel castings, and the pinions from steel [illegible] gearing is completely covered for protection against accidents.

The driving shafts are made of 75-point carbon steel, and are ground, after the splining and all work has been done, to insure accuracy. Large reservoirs with self-oiling wicks furnish continuous lubrication to the shaft bearings. Each bearing is provided with a small reservoir, and an oil groove is cut on the inside at the top and bottom. The bearings for the driving shafts are ground internally and are fitted into the bed, the holes in the bed being bored out to a jig. No bushing is less than 7 in. long.

Knee and Cross-rail

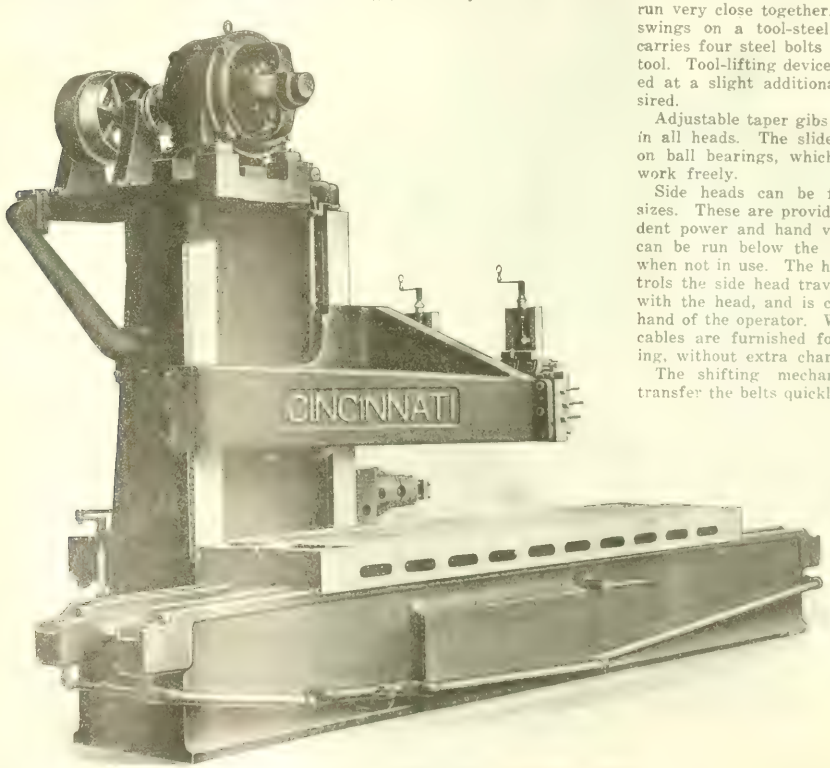
The crossrail is bolted and doweled to the knee and is raised and lowered by means of a power-elevating device operated through frictions by the lever on the right side of the column. The knee is formed at the top to provide a long bearing on the face of the column; it is also provided with a narrow guide arrangement with taper gibs and clamps.

The heads are distinctive, the end of the tool block and slide being made round to avoid projecting corners on angular work. They are scraped to the rail, and graduated for swiveling up to 90 deg. They have automatic feeds in all directions, and can be operated from either side of the machine. The saddles being right and left, the heads can be run very close together. The tool block swings on a tool-steel taper pin, and carries four steel bolts for clamping the tool. Tool-lifting devices can be furnished at a slight additional cost when desired.

Adjustable taper gibs are incorporated in all heads. The slides are also hung on ball bearings, which allow them to work freely.

Side heads can be furnished on all sizes. These are provided with independent power and hand vertical feed, and can be run below the top of the table when not in use. The handle which controls the side head travels up and down with the head, and is convenient to the hand of the operator. Weights and wire cables are furnished for counterbalancing, without extra charge.

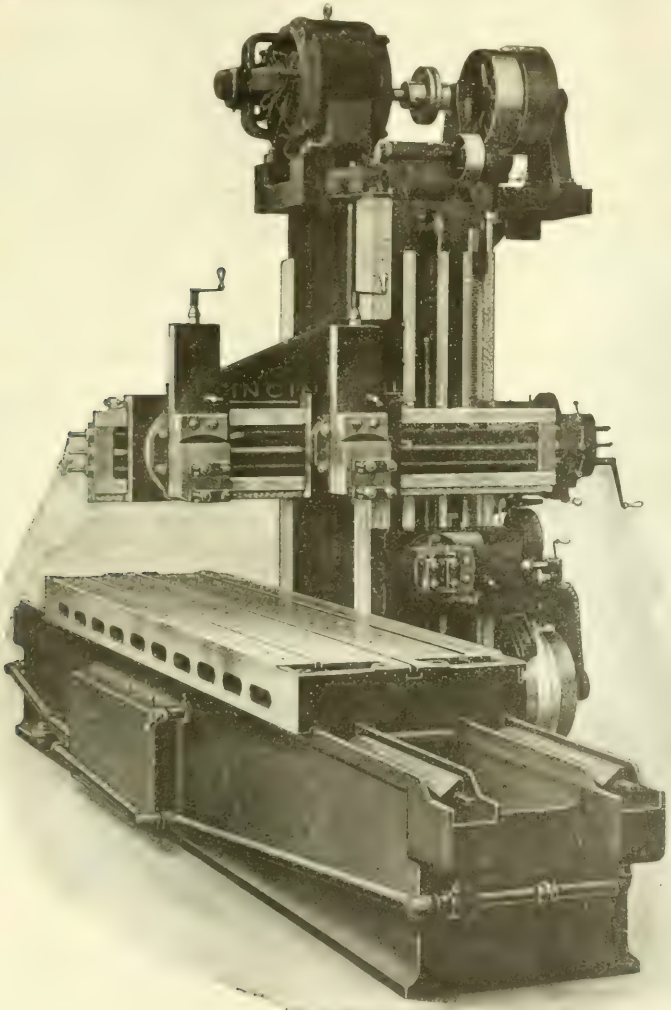
The shifting mechanism is said to transfer the belts quickly and noiselessly



[illegible] MACHINE FROM ANOTHER ANGLE

when running at the highest speeds. The belt arms are provided with an adjustment that keeps them in proper position at all times, and are provided with an extra support on the bracket which relieves the fulcrum stud from undue strain, doing away with the usual wear at this point. The studs are hardened and ground. The cam and rollers are protected from dirt by a cover, which entirely incloses the mechanism. A drip pan is provided under the shifting mechanism for catching the oil, preventing it from getting on the belts. By means of shifting levers at both the front and rear the operator can control the motion of the table without walking around the machine. The safety locking device permanently locks the entire shifting mechanism, preventing the table from starting, except at the will of the operator. This is a valuable attachment, being a safeguard against accident and spoiled work. It consists of a spring plunger, which enters a seat in the bed, and holds the shifting lever in a fixed position.

No doubt further detailed information on these machines can be easily secured by those interested, if a written request is forwarded to this concern.



ANOTHER VIEW OF THIS MACHINE

JAPAN'S STEEL CONSUMPTION

The consumption of steel in Japan, which was only 218,000 tons in 1902, and had risen to 654,000 tons, or more than treble, in ten years, has been increasing in the same ratio ever since, and the total reached 1,182,000 tons in 1917. Assuming that the demand increases at this ratio henceforward, the production for 1920 should amount to 1,635,000 tons.

The demand during 1917 was adequately met with imports assisted by domestic products, but in the meantime, Japan's steel industries have made considerable progress. Before the war the demand was met almost wholly by imports. Thus, in 1902 the consumption was 218,000 tons, of which the Japanese products accounted for only 31,000 tons, or 15 per cent. Later, the Government Iron Works began producing steel, and the domestic output reached a respectable amount in 1911. Still the figure for 1911 was only 191,000 tons, representing only 30 per cent. of the whole demand for the year. The proportion was increased to 33 per cent. for 1913, and for 1914 the figure grew to 282,000 tons. Imports of steel in 1913 were 543,000 tons, but they fell off to 408,000 tons in 1914. In 1915 they had further decreased to 243,000 tons. This was due to a diminution of the supplies from England, Germany and Belgium. For 1916 the figures rose to 454,000 tons, as the American supply had increased; and for 1917 it reached 675,000 tons. America began supplying Japan with steel only upon the stoppage of the English and German supplies. In 1914 American imports were 68,000 tons. They rose to 133,000 tons in 1915, to 291,000 tons for 1916, and to 680,000 tons for 1917. Later the American supply fell off as a result of the U.S. prohibition of exports.

In 1914 the total consumption of steel was 660,000 tons, but had reached 810,000 tons in 1916, and 1,180,000 tons in 1917. As the imports did not increase in proportion, the requirements were covered principally by an increased domestic yield. In 1914 the domestic products were 282,000 tons, but for 1917 they were nearly doubled to 529,000 tons. The price of steel under these conditions increased greatly. Cast steel, for instance, is now quoted at Y. 1,200 per ton, as against Y.200 of Y.220 before the war, and wrought steel has risen from Y.150 or Y.200 to Y.850 in the same interval.

As a result of this Japanese steel works have been making profits of 120 per cent., and have paid 50 per cent. dividends. Encouraged by this they have all extended or are extending their activities, the most ambitions of these extension plans being those of the Japan Steel Tube Works, the Nitto Steel Works, the Oshima Steel Works, the Kobe Steel Works and the Tokai Steel Works.

There are now the Japan Specific Steel Works, the Hirota Steel Works of the Fujita-gumi, the Dobashi Steel Works, the Electro-Steel Works and the Japan Electro-Iron Works, and others, turning out high speed steel, but there seems to be still something to be desired on the technical side, as sometimes very fine qualities are produced, but, generally speaking, the products are not yet up to the uniform high standard required.

NEW TYPE OF NUT LOCK

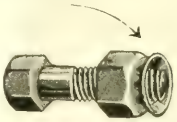
GUARDING against accident to life and machinery is one of the most important features of industrial enterprise. "Safety first" movements have made remarkable progress during the past few years, and the beneficial results have been ample compensation for the time and money spent for the better protection of the worker, and the safer operation of machinery and equipment. Injuries to workers are very frequently associated with the disarrangement of some portion of the mechanism, following the loosening of a nut or bolt. The securing of a nut, to prevent it backing off as a result of vibration, stretch or other cause, has long been a study of mechanical engineers and manufacturing executives.

The accompanying cuts illustrate a new type of nut lock that is being placed on the market by Edward A. Robinson Co., Ltd., of 228 Craig street, Montreal. This Hold Tite Nut Lock is a novel departure from the usual method, inasmuch as no additional nut is used, the lock being obtained by means of a specially designed washer, the use of which, it is claimed, has many advantages over the extra nut variety of locking devices.

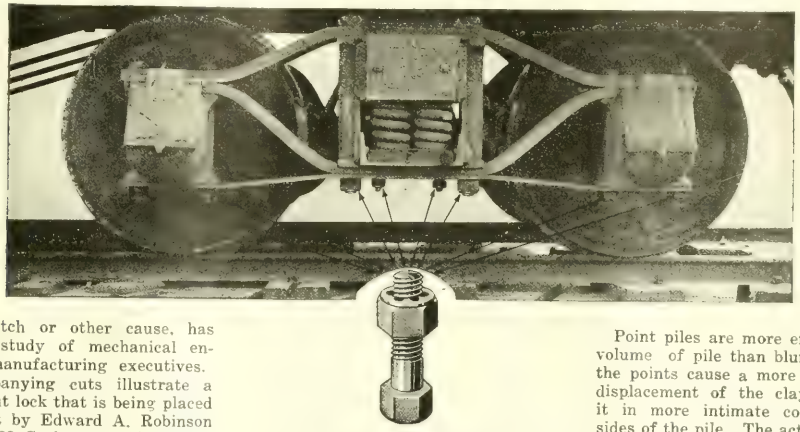


As shown in the illustrations the method of applying the nut lock is extremely simple, but its simplicity is one of the greatest factors of its efficiency. The notched inner edge of the washer is placed against the outer surface of the nut after the same has been thoroughly tightened. The nut lock is then forced to its locking position by means of another nut, or forced down by the blows of a hammer. This action causes the edges of the notched portion to grip the thread close to the nut, and wedges the two so firmly together that no amount of vibration will change their initial locking position. The thread of the bolt is not distorted, and only a slight injury is made at a few points on the thread immediately adjoining the nut, but this has little effect on the removal of the nut when such is desired.

The nut lock being quite thin it is an easy matter to split it when occasion requires. Another feature in this respect is the saving in the thread and bolt length, an important detail where many bolts are used and where lightness is essential. With this device it is claimed



that the shoulders on many shafts may be eliminated, and, by the use of shallow grooves parts can be rigidly located in position. In this way a saving of material is effected and machining operations reduced.



THE NUT LOCK IN ACTUAL USE.

RESISTANCE OF CLAY

For tapered bodies gradually forced into clay the load necessary to produce a given penetration is very much greater the less the percentage of water in the clay. Clay containing a definite percentage of water, and at a definite temperature, has a definite pressure of fluidity, and when this pressure is reached and maintained the clay yields indefinitely as a dense and viscous fluid, unless it be restrained from flowing or caused to rise so as to produce a statical head of clay. The pressure of fluidity is greater when the percentage of water is less, or when the temperature is lower. The pressure of fluidity per se is independent of the depth and depends solely on the percentage of water in the clay and the temperature of the clay.

For equal depths, tapered piles support a larger load per unit volume of the piles than piles having parallel sides. The reason is that in the case of tapered piles their surfaces keep in more intimate contact with the clay, with the result that the support due to the friction on their sides is greater than is the case in parallel piles. In order to increase the resistance of piles they should be corrugated as well as tapered. The reasons why parallel piles with blunt ends are not so efficient per unit volume is that the pile, in entering the clay, rubs the surfaces near the top of the hole made so much that the friction (or cohesion) is reduced there, and also because the clay, in squeezing laterally from under the end particularly loses contact with the sides of the pile, thus also reducing the friction on which the supporting capacity of a pile depends. The mean intensity of friction for the same depth of penetration on the sides of parallel piles is greater in the case of piles of small cross-section than in the larger ones, but if the diameter of the pile be reduced beyond a certain amount (the depth of penetration being constant) then the mean intensity of the friction appears to decrease again. Consequently, for a given quantity of material of which to make piles a large number of small piles is more efficient than a smaller number of large ones.

Point piles are more efficient per unit volume of pile than blunt ones because the points cause a more gradual lateral displacement of the clay, thus leaving it in more intimate contact with the sides of the pile. The action of the point of a pile is to cause the pressure of fluidity to be attained on its surface, whereupon the clay flows out of the way.

The resistance to penetration is considerably greater the lower the temperature of the clay, probably because the pressure of fluidity increases as the temperature decreases. The density of clay decreases as the percentage of water increases. The work done per unit volume of displacement increases as the angle of taper decreases, but when the taper approaches 0, or is 0, then the work done is less than when the angle of taper is larger. When a disc is forced into clay, the sides of the hole do not crush in (unless a certain critical depth be attained) because the pressure of fluidity of the clay having been attained immediately under the disc, the clay flows laterally, but the moment it has escaped from beneath the disc the pressure is reduced to the statical pressure corresponding to the local head of clay, and when this is less than the pressure of fluidity the clay does not flow into the hole made by the disc. If, however, the penetration of the disc be carried far enough, then ultimately the statical head of clay will be equal to the pressure of fluidity and the sides of the hole near the bottom will crush in.

The friction of clay on wood was found to be greater than on tin plate. The tensile strength of the clay experimented with was greater when it was raw and dry than when it was baked.

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The Metal Workers' Strike

FROM information coming to CANADIAN MACHINERY from what it considers to be most reliable sources, there is a feeling abroad that the metal workers' strike in Toronto can and should be settled. The belief is becoming very general that the moderate men on both sides could come together and bring about a basis that would bring the men back to work in short time.

This is not a time to stick at small things, neither on the part of the men nor the employers.

There are two sides to every question, and there is no chance under the sun that in the present struggle the men are all in the right or the employers are all in the wrong, neither is there any likelihood that the employers are the holders of all the virtues and the men of all the shortcomings.

There are cases of hardships on both sides. There are molders and mechanics who cannot stand the strike that they are engaged in. They make a good fight, and they are not complaining openly, but it does not take a great deal to get beneath the surface. They know that the summer is well on, and that they have expended in many cases what savings they have, and in many other cases they have borrowed. Strike pay at best is only an aggravation, it cannot, for a married man, do much more than pay rent.

There are shops that are suffering for the want of the skilled mechanic. There are jobs that have to be turned away, and there is work being directed to other and strange channels that it may take some time to recover. There is tool room work that has been sent out to other centres—in some cases across the line. There are general managers and other executives occupying higher-up positions who want their men back. They feel that they should never have left them because what differences there were were not insurmountable by any means. They feel that a little reasoning together would clear the air.

There are shops where the men have actually come in a body to discuss the matter with the management, and it was found that there was, as stated above, very little difference of opinion. Certainly there does not appear to be any great issue at stake that would warrant making the present a protracted strike, in which suffering is certain to be brought upon a great number of people.

Why not look at the thing in a big way? The strike has got to be settled some time. These men who are out in hundreds now are going to go to work some time, in some shop. These shops where the strike has taken place are going to operate by some means or other. There is nothing more certain. They are not going to stand idle forever. Well, if these things are going to come to pass eventually, why not now? The longer the men remain away from work, the harder on their pockets, and the harder for the shops to gather up the old lines to keep the works busy.

The average healthy, wholesale man does not like a strike. There may be an impression abroad that a mechanic glories in a strike. He does not. He does not relish being idle.

The same employer does not care for a strike. It may be imagined that the heads of companies and corporations have no concern for the men. It may be popular opinion that they rather delight in getting a strike on in order to run down the scale of wages and lengthen out the hours of employment. That class of employer is a rarity. This paper knows for positive fact that there are lots of big employers in Toronto whose greatest joy is in what they can put into their business, and what their business can enable them to do for the men working for them. It is a serious and a cruel blunder to picture employers as a class as being grasping and selfish.

The time is certainly here for the average men on both sides to come together. This Toronto strike can be settled. Of that there seems to be no doubt. These parties should come together with an open, unbiased mind and get down to brass tacks.

Business Conditions Sound

REPORTS from the larger steel producing centres state that the rate of production is increasing. In at least two leading lines some of the mills have put their prices on a higher level, and in doing so they give evidence that they are not afraid of sacrificing any business.

There is undoubtedly a stronger tone in the market. It is being reflected even in the scrap metal market, where bids are on the increase for any material offering.

There are, and probably always will be, cases where price concessions will be made for a desirable tonnage. That is not a sign of weakness. It is simply following out the practice of every business, where an advantage rests with the purchaser who comes into the market with a worth-while order.

In some of the larger cities of the Dominion it is safe to state there are millions of dollars' worth of structural orders waiting for conditions to become more favorable before proceeding with the work of erection. There is a degree of urgency in some of these cases that is likely to bring action soon.

The foundations of trade are secure. There may be a little tightening in some lines, but it is not general. There are good days on ahead. Business conditions have had testing enough to wreck them. There has been a regular procession of monkey wrenches tossed into the wheels of industry, and if affairs were going to seed they would have done so long since. The very fact that we are still a good distance from the bow-wows is proof enough that we are not yet headed in that direction.

TWO lawyers, by mistake, got locked up for a couple of hours in a Detroit jail. Justice may be slow, but it is sure in the end.

IT IS predicted that the habit of giving tips will pass out largely in United States with the coming of prohibition. The claim is that a man parts with his money more readily when half-tanked. Not so. We've seen a perfectly sober man part with his coin when a porter took his young broom and made a couple of swipes at an imaginary spot in the middle of his back.

IN SOME states a person who has been fined for speeding is forced to have a distinguishing mark placed on his car. There are some drivers, who, were their gigs decorated every time they kicked over the limits, would have their outfits looking like a barber pole sprouting in a poppy patch.

Giving the German U.C.-97 the "Once Over"

The Mechanism a Marvel of Compactness

By T. H. TENNER, Editor Marine Engineering

IN the days when we used to read Clark Russell and Capt. Marryatt, most of us were familiar with the pirate barque, the first view of which was the flash of a royal sail above the horizon. Quickly she rose, till she lay revealed as "a long, low, rakish craft," and we busily prepared for action while our mothers vainly called us to come for supper.

Some vagrant thoughts of this nature came to my mind on my way to the Toronto wharf, where lay a craft, lately manned by more cruel and bloodthirsty pirates than our boyhood authors ever dreamed of. They differed in other respects too. The pirate of the Spanish Main fought generally till his ship went down under him. The North Sea pirates usually submerged their ships before the fight started, though, of course, many of them, like the famous McGinty, haven't come up yet.

The "U.C. 97" is certainly long and low, but she is anything but rakish looking. Her length overall is 191 ft., and her beam 18 ft. Her depth is about 12 ft. From the outside she looks familiar, so many photos and moving pictures having been seen of late of this type of craft. The comparatively high forward deck, with the superstructure forming the conning tower hatch standing prominently out, the 10.5 centimetre gun on the fore deck, all fitted into one's preconceived idea of the vessel.

The "U.C. 97" was built in the same year that saw her inglorious surrender, so she is a good example of the later type. She is of the mine laying class, being furnished with six mine tubes, and able to carry fourteen mines.

There is not much to be seen on deck, though what there is attracts one's interest. The most prominent object, of course, is the periscope, which rises from the central control room to a height of about ten feet from the deck. There is a round hatch just forward of this, giving ingress to the forward end of the hull, while there is another hatch aft, opening into the engine room. These are in addition to the main, or conning tower opening, which was the one used chiefly when pursuing her occupation in war time.

Just abaft the conning tower is a metal plate upon which was written the words in German, "Telegraphieren Sie sofort liegestelle an Ubootsverein Kiel." Then in addition, "Unterseeboot hier gesunken." The meaning of this eruption of caligraphic symbols in plain English is, "Telegraph at once to the U-boat depot at Kiel, U-boat sunk here." If the pirate met his just deserts, this plate was to be attached to a buoy, when it would form a guide to the fate of the vessel.

Another point that attracted the eye was the life buoys, upon which were painted in black letters the legend "U.C. 97, ex-German submarine." The "ex" is what appeals to the Canadian visitor.

Leaving the deck, one descends the after hatch to the engine room, and is immediately impressed with the idea of compactness carried to the nth power. The writer has been in the engine rooms of T.B.D.'s and battleships, which are good examples of fitting a large amount of machinery into a small space, but never has he seen anything to compare with this.

One's first idea is that if for any reason this power plant should be taken out of the hull and placed on the dock, it would never be put back again. The mind at first seems unable to correlate the various parts and their uses. The network of pipes, valves, electric wires, instruments, switchboard, telegraphs, all seem a hopeless jumble. However, with the courteous assistance of the U.S. navy man in charge of the engine room things began to clarify. As this man has been in the vessel since she left Harwich, Eng., to cross the Atlantic under her own power, he is pretty well acquainted with her, and very willing to impart his information.

Everything Is German

Everything in the boat being German made the instruments and valves and telegraphs are lettered and marked in German. This made them as useful to the American crew that took her over as a musket would be to a cow. They discovered the meaning of the various things by elimination and experimenting. They traced valves and wires when it could be done, and when it couldn't jammed in the switch or opened the valve and observed results. This is a good plan, though not recommended to one of weak nerves. It may interest some of the protagonists and antagonists of the metric system to know that the centigrade scale is used for temperatures, while pressures are marked in atmospheres.

The main propelling plant consists, of course, of internal combustion engines. These are connected through a positive clutch to the main generators or motors as the case may be. The engines are of the four-cycle type, having six cylinders to each engine, twelve in all. They run at about 450 revolutions per minute, developing about 300 b.h.p. on each engine. They are of the full Diesel type, the compression pressure carried being about 700 lbs. per sq. in. On the forward end of each engine is carried the fuel oil pump, which is operated from the crank shaft by a chain drive. The pump is of the constant stroke type, and regulation is effected by cutting down the fuel delivered to the cylinders, the superfluous oil being passed back to the suction side.

The motors for driving the vessel when under the surface are situated at the after end of the engine, with a clutch interposed, as mentioned. When on the surface the engine drives, the motors are generators, the current being used to charge the storage batteries, these being in two units, of 62 cells each, 124 cells in all. The capacity of this battery is 8,800 ampere hours. It may be remarked here that every auxiliary is electrically operated, the telegraph indicators from control room to engine room and their stations included. Another feature of these telegraphs is that not only does the order appear on the dial, but a pilot lamp is also lighted.

Large Number of Motors

At this stage attention was drawn to the fact that for steering gears, pump and winch operating, as well as other auxiliaries, there were 30 motors of various sizes installed, besides the main motors. The engineer then began to point some of them out, and the writer began to feel like a child at a conjuring show. He delved between the main engines and found three or four motors behind each, pointed to our feet and discovered more, and showed some fastened to the frames in a vertical position. While taking these facts in, one noticed the arrangement of the various spanners needed for overhauling. These were mounted on plates fastened to the frames where they curved inwards over the top of the engines, and were in such a position that they could be reached in a moment and at the same time were out of everybody's way.

At the after end of the starboard engine is a four-stage motor-driven air compressor. This supplies the air for compression, starting and reserve flask for the main engines. It is like everything else on this craft, a miracle of compactness. The low, or rather the first stage and second stage cylinders are on the bottom, while the third and fourth stage are on top of these, tandem fashion. The intercooling is done by coils in the base of the bedplate. This machine delivers the air at a pressure of 600 lbs. per sq. in. to the cylinders and reserve flask. At the after end of the port engine is placed an auxiliary

(Continued on page 685.)



MARKET DEVELOPMENTS



Lots of Business—But It's on Paper Yet

Structural Steel Should Come Along With Some Big Orders Soon—United States Mills Are Now Asking, in a Few Cases, an Increase Over Prices That Have Prevailed for Some Weeks

THE particular branch of the steel industry interested in structurals is watching eagerly for some sign of the opening of the building season. It is estimated that there must be, in Toronto alone, some $15,000,000 worth of buildings—on paper. When these can be converted in real business there should be some trade worth securing. A movement in structurals would be good news for the Canadian trade. It is difficult to keep as closely in touch with the situation here as in United States, because statistics are more complete and more accessible. For instance, the Bridge Builders and Structural Society can state definitely that, in proportion to the capacity of shops, the work placed is as follows: January, 12 per cent.; February, 12½ per cent.; March, 17 per cent.; April, 24½ per cent.; May, 49 per cent.

It is worthy of note that some of the American steel mills are now asking a firmer price on such staple lines as steel plate and iron and steel bars, the increase being about $1 per ton. Thus they quote 2.70 for plate against the prevailing 2.65. There are other indications that bolster up the argument of those who hold that a buying movement of any size at all will bring about an increase in prices, although they are yet far and above the pre-war level. While all this may be quite true, it is no use losing sight of the fact that a good-sized tonnage gets a very fair market preference.

Small tools and supplies are not selling in any volume. The market for these is tighter than usual. Most of the shops that have been getting in equipment have done so, and not until they come to the point of production will there be any call for new supplies for replacement purposes. There are various orders and inquiries out in the market in certain sections, but it is hard to tell whether they are all genuine, or merely tossed in to find out the strength and movement of the market.

There is more strength in the scrap metal business than for some weeks. Copper and red brass are stronger, but the rest of the group did not move up along with these. Steel and iron remain somewhat stagnant. It is apparently a good time to buy for use, and a good time to hold for speculation.

SIGNING OF PEACE SHOULD REMOVE THE BIG BOGEY FROM THE MARKET

Special to CANADIAN MACHINERY.

MONTREAL, June 26.—General business activity continues steady without special feature, although strikes are still a factor that prevents speedy adjustment of industrial conditions. With this to offset signing of peace it begins to be a question whether the next week or so will develop any pronounced activity of a permanent character. Settlement of labor difficulties is virtually imperative before actual reconstruction can be commenced. It is thought by many, however, that the element of strife is gradually dying out and that a spirit of co-operation will form a basis of agreement between capital and labor, so that before the summer is over, industrial life will become more settled and resumption of business will be more general and open the way for greater expansion. Steel business is still of a nominal character with dealers holding firm on all price quotations. There is [illegible] that mills are gradually increasing their output, but the present demand does not imply that consumption has greatly increased. The metal situation, seemingly, is steadily growing stronger, and this is reflected in price advances. Machine tools are moving slowly but steadily. Old materials are in slightly better demand with the market firm.

Machine Tools Move Slowly

Some dealers report a fairly good business in single tools, while others state that sales are particularly light, the bulk of the existing business being in the small tools and supplies. In some cases where tools have been on order time extensions were necessary owing to the effect of labor troubles on production. Delivery on tools of a special character is becoming more uncertain. The argument of an unsigned peace will soon be a thing of the past, and it will then be seen what actual bearing this phase of present unsettled conditions has upon the delayed start on general reconstruction. The labor unrest and the contention that cost of production does not warrant expansion may be the next forte of the backward manufacturer. In the meantime the possibility of enlarging our export trade is gradually becoming more difficult owing to the efforts put forth by other manufacturing countries. The storage of machine tools belonging to the American Government is still in effect here as few of these have as yet been disposed of.

Scrap Continues Firm

No important developments have taken place in the old material situation, but the steady demand for small quantities is encouraging in face of the quiet character of the past two months' business. While dealers are not generally accumulating large stocks there is less reluctance to purchase when reasonable supplies can be acquired. The added interest of the consumer reflects the returning confidence in the trade and the belief is accelerating that activity will soon be of a nominal nature. The present demand is well distributed although heavy melting steel and machine shop

turnings appear to have a leading position. The sales in the district are about the same, but present inquiry apparently indicated a heavier demand shortly. Much of the material now moving is going to American buyers. The advances noted last week are still holding, and it would not be surprising to hear of a stronger market at an early date.

Metals Continue Strong

The metal market appears to emphasize the belief that a firm market may develop out of the prevailing unsettled conditions. The present demand is not excessive, and in fact is not much greater than that of the past several weeks, but the steady nature of the business that is now passing through the dealers' hands would seem to indicate that consumers are showing greater confidence and are better assured that existing circumstances will hardly permit a lower level for price quotations. Copper has taken on additional strength on the rise of the American market, and the local quotation of 20½ cents for lake and 19½ cents for electro, represents an advance of one cent per pound. The present supply of unsold tin in the States prevents the entire removal of import restrictions, but this will probably adjust itself within a month or so, and lower price quotations may shortly follow. Dealers here quote 56 cents per pound. Spelter has developed strength in the States, and if this continues prices here will likely advance; at present the metal is firm at 8½ cents per pound.

Lead is moving a little better and an advance of ½ cent puts the current price at 7 cents per pound. Antimony shows a similar advance, the quotation being 9½ cents per pound. Aluminum is unchanged at 38 cents per pound.

PLENTY OF WORK BUT MOST ON PAPER

Buying in This District is Largely Confined to the Actual Needs of the Case

TORONTO.—Buying is big on paper and small in reality. That is another way of stating that dealers are having a hard time trying to convert some of the blueprints into actual business. It is commonly reported that a large amount of structurals must be placed shortly, as programmes that call for their use have been prepared some time now, and the need for the building is going to become more pressing as time goes on.

Buying is not heavy this week. It is still of the hand-to-mouth sort, and seems likely to continue so.

Much Stock on Hand Yet

Some of the local warehouses are not yet cleared out of all their war material. They had been buying heavily during the war, finding it necessary to carry a heavy stock in many lines in order to keep the material on hand that the builders of war machinery and supplies needed on short notice. Of course, they could not control the prices at which this stock was taken in, and there has been quite a decline in several lines, it coming quickly and giving them no chance, in a comparatively small market, to get rid of their war material.

In fact one of the large warehouse men, speaking about this to CANADIAN MACHINERY this week, stated that his firm could not make money on the year's operations now. "It is a queer way to look at it, but the more we sell the more we lose, as there are indications of the market becoming stronger in some of the lines."

Buying of warehouse material is dull. The orders that come in are small, and those firms that have contracts that will carry them on for some time are fairly well covered in the main.

The movement of structurals, stated another dealer, must start in the not distant future. "I have been told," he stated, "that there are in Toronto at least $15,000,000 worth of structural buildings on paper in the office of the architects. There are in the list stores and office and apartment buildings, and there are many cases in which the erection is going to be a matter of necessity, which may prove the determining factor in causing these people to come into the structural market to buy their material. As far as we can learn the price of the steel shapes is not the main consideration. The would-be builders are scared out of action by the prices they will have to pay for everything in the nature of supplies, and the wages of the trades employed are still very high in comparison with other buildin that are carrying on business with which the new high priced building will have to compete. A movement in structurals," he stated, "would be one of the best things that we have had a chance of seeing for many a month."

There are no indications that prices are going any lower. Against this is the fact that some of the independents are putting their prices up on certain lines. For instance some of the mills now quote steel plate at 2.70 base, against the prevailing 2.65, claiming that they could not make money at the lower price.

Travelers who cover the northern part of the country claim that the bookings have been good with them. Interests in that section seem to be quite satisfied that prices can be no lower under present conditions, and they are going ahead on the assumption that any change made will be toward a higher level.

Small tools and supplies in general are not moving out quickly in this section. Firms that are equipping have been pretty well supplied, and the wear of actual production has not started yet to bring them into the market for repeat or replacement orders. Canadian high speed cutters have an advantage under present conditions in some high speed lines. The Canadian list sells net now, while the U. S. goods have to go at list plus 40 to make up for the duty and other charges.

Montreal has marked prices in advance of what Toronto is prepared to go, and that is but natural, as Montreal is rated more as a consuming point than Toronto, and freight makes the difference. In the local list this week all coppers and red brass are stronger. The yellows remain the same, the cause probably being because spelter and lead are rather weak in tone.

The copper class is stronger, without a doubt, and it is a safe guess that prices will be marked up again before many days are over, as everything seems to point in that direction.

The market for scrap iron and steel is weak. This may be due to the strike, and some dealers even go so far as state that it is due to the peace terms not being signed. Dealers report that there is not a great deal of material being offered, as it seems most of the holders are looking for more money for their assortments and are hanging on in consequence.

POINTS IN WEEK'S MARKETING NOTES

Pittsburgh reports that the improvement in the placing of steel orders is keeping up, and that in some lines capacity is now near the 75 per cent. mark.

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Some of the independent mills are asking a better price for plate and bars than has been going for some time. The increase amounts to about $1 per ton.

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A large amount of structural steel should come into the market some time soon. One dealer figures that in Toronto alone there are $15,000,000 in buildings on paper.

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Some of the Canadian warehouse men claim they will lose money on the year's business. This is due to a large stock when the war ended and subsequent shrinkage in price. "The more we sell the more we lose," was one dealer's way of stating the case.

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The sale of small tools and supplies in general is limited at present. The settling of strikes and the securing of production is necessary before this business will become very active again.

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The automobile business has been responsible for nearly all the sales of machine tools that have been made across the line for some months past.

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There is more strength in certain parts of the scrap metal market this week. Copper and brass are bringing better prices, but the recovery in the iron and steel is not well under way yet.

AUTO BUSINESS THE BIG ANCHOR OF NEW YORK MACHINE TOOL BUSINESS

Special to CANADIAN MACHINERY

NEW YORK, June 26.—There is quite a contrast between the Central West and the East in the volume of machine tool business. With many machine-tool manufacturers Detroit has been the most productive source of orders since the first of the year, but Chicago and Cleveland have also been showing considerable activity, while the Eastern markets, New York, Boston and Philadelphia, in particular, are rather quiet. A moderate business in small lots is being done in the East, but the volume of orders is by no means up to expectations.

During the past week there have been a few buyers of fair-sized lists of tools, notably the Fellows Gear Shaper Co., Springfield, Vt.; the New England Westinghouse Co., Springfield, Mass.; the Wright Roller Bearing Co., Philadelphia. In all three cases the buying of new equipment is directly attributable to the activity in the automotive industry. The Fellows Gear Shaper Co. has received so many orders for its gear shapers from automobile companies that an addition to its plant was made necessary. The New England Westinghouse Co. is engaging in the manufacture of electric starters and lighters for automobiles, and the Wright Roller Bearing Co. is making bearings for automobiles. Most of the activity in the machine-tool trade in recent months has been traceable to the expansion of the automobile industry, and manufacturers in other lines, with some exceptions, have not yet hit their normal manufacturing stride.

It is difficult to gauge the extent to which sales of new tools are being lessened by the immense amount of second-hand machinery on the market, but it is considerable. Many of the used tools being offered are practically as good as new, and manufacturers in some lines are taking advantage of the opportunity to make savings. Some machine-tool builders are taking back tools of their own make from war plants, are rebuilding them, and are selling them with their own guarantee the same as if the tool were brand new. This is done to prevent, as far as possible, the sale of tools of their make which are not in good condition and which would, therefore, cause dissatisfaction.

In the Chicago market two good-sized lists are now active. The Chicago Pneumatic Tool Co. requires about 40 or 50 tools for its new plant at Franklin, Pa., now in course of construction, and the Worthington Pump and Machinery Corporation wants about an equal number of tools for its Cudahy, Wis., plant. The Defiance Machine Works, Defiance, Ohio, has received an order for special machines from the General Motors Corporation, the order totalling about $1,500,000.

PITTSBURGH REPORTS THAT THERE IS NO LET-UP IN THE IMPROVED MARKET

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., June 26.—On the whole there has been a further improvement in the demand for finished steel products. The indication is that buyers want more material for current consumption rather than being desirous of covering ahead. This gives the market a strong position as the demand does not rest upon mere "confidence" in the future, so much spoken of, but rather upon the actual current consumption of steel being larger.

In one line, however, the heavy buying of the past few weeks has resulted in the purchases being for forward deliveries even though the buyers would prefer early deliveries. That line is "oil country goods" and particularly the larger sizes of lap weld pipe. Several of the mills have fallen behind in deliveries and have to enter their customers' orders as for forward delivery when prompt delivery would be preferred. One large interest has such an accumulation of orders that its lap weld departments would be kept busy to the end of the year even if there were a considerable falling off in the rate of buying, while such falling off is not expected.

In sheets there is a little banking up of orders and deliveries of some classes of sheets are deferred. The mills could meet this situation by operating at heavier rates as the average sheet mill operations are now about 70 per cent., but they do not wish to do this, since, if the market follows precedents, there will be a slackening in demand for July and August, and it is well to have a reserve of orders and maintain a uniform pace

Wire products show a demand that is altogether satisfactory to the mills, and is larger than some mills counted upon. One large independent interest, for instance, figured on a certain demand through the summer and concluded it could spare one of its two-rod mills for a rebuilding operation. It now finds itself now [illegible] to put its orders with the other rod mill.

In bars, plates and tin plates, there is no material improvement in demand. The [illegible] below capacity, which was increased so much during the war, and it is doubtful whether plate mills as a whole are operating at anything like 50 per cent. of capacity.

Structural Demand

Starting with practically nothing a few months ago there has been a progressive improvement in building operations involving skeleton steel structure and in bridges. The activity in new construction of this general class is still very light compared with the activity in ordinary everyday consumption of steel, but it is on the increase. The fabricated steel jobs being let are all small, with an occasional exception, but as reported for some time past a large amount of work has been designed and figured upon, so that when investors are ready to give the word there will be little delay in starting the actual work and specifying the shapes for the mills to roll.

The reports of the Bridge Builders' and Structural Society show that up to date, the amount of fabricated steel work placed is [illegible], but also that there has been a constant, and of late, a rapid increase in the volume of business. These reports show, in fabricated steel jobs let relative to the capacity of the fabricating shops, the following: January, 12 per cent.; February, 12½ per cent.; March, 17 per cent.; April, 24½ per cent.; May, 45 per cent. The doubling from April to May is particularly significant.

Pig Iron Irregular

There are many irregularities in the pig iron market but they are ascribable in large part to the fact that the pig iron market started out on a false basis, there being simply horizontal reductions of $3 a ton in December and $4.25 a ton effective March 21, the latter being the reduction recommended by the Industrial Board, afterwards defunct. This left it that the March 21 prices were based upon the basings adopted for the war control. That was necessary in the circumstances but it was not the logical structure or the structure the market had maintained prior to the war, when prices were reached through competition. Pig iron f.o.b. Birmingham furnaces, for instance, should not be as high as f.o.b. Chicago or valley furnaces. Again, the war control allowed eastern Pennsylvania furnaces to base prices at Pittsburgh, while Buffalo had to take the same price f.o.b. furnace. Accordingly, Birmingham prices declined while the eastern Pennsylvania furnaces had to get on an f.o.b. furnace basis, which involved a decline. It might be supposed that Buffalo would have been able to maintain the price, but such was not the case as Buffalo furnaces have lately sold at $25.50 to $26 at furnace. No. 2 foundry with silicon 1.75 to 2.25 per cent., on which the Industrial Board price was $26.75, furnace. A price which the valley furnaces are still making an effort to maintain. On silicon, 2.25 to 2.75 per cent., on which the War Industries Board allowed an extra of $1.25, differentials of 50c to $1 are now more common.

The pig iron markets cannot be quoted closely for the reason that in many cases the furnaces will quote f.o.b. furnace price for iron to go out of the district rather than to customers in their own districts. They are doing what in International trade is called "dumping," and there is greater competition between districts than usually obtains.

Generally speaking, however, pig iron has declined very little, and there is not much prospect of its declining in future. This does not mean that it is going to advance shortly, though there are some

predictions along that line. Pig iron is always sluggish about starting advances, though it sometimes moves fast once it gets going. When there is a large number of idle furnaces, as at present, prospects of better demand tends to bring the furnaces in. They expect higher prices but they are willing to sell a limited tonnage as "backlog" at current prices, or even at cut prices. This occurred in the first half of 1915, when pig iron demand continually increased, but as one furnace after another came in it acted as a drag on the market. Furnaces would not cut prices much, however, as they could not afford to do so. No furnace would take orders at a loss just for the sake of getting into operation again.

Connellsville Coke

This is the usual period for semi-annual contracts for Connellsville furnace coke. A few weeks ago there was talk of flat prices for the half year but coke operators wanted considerably more than furnaces would pay, and as the operators expected pig iron to advance and furnaces were not so sure about that, there was little difficulty in arranging sliding scale contracts, the price of coke delivered each month being fixed by the prevailing price of pig iron. These ratio contracts are practically all on the basis of 6¼ to 1, i.e., if basic pig iron is $25, valley, which is about the market now, the coke will be billed at $4 per net ton at ovens. Every change of 25c in pig iron would mean a change of 4c in the billing price of coke. Foundry coke has sold rather freely for second half at $5 to $5.50, depending on grade.

THERE IS A LOT OF PIG IRON BEING BOUGHT IN U.S. POINTS

THE heavy buying movement noticed last week still continues. The steel making grades are not in request, the large volume of business being confined to the foundry and malleable class.

Chicago.—If the present demand keeps up some of the furnaces that are now out will have to be blown in again. Iron in yards and the somewhat restricted daily output has been sufficient to meet demand up to now, but with some firms taking more iron for second half than they have usually required for the whole year, more production will be necessary.

New York.—There has been lively buying during the past week, and certain sellers have been cutting prices to get a share of the business, though the general tendency is for higher rather than lower prices. Sales of foundry amounted during the week to around 50,000 tons, and there is still a good demand.

Boston.—Total sales while smaller than last week's have been fairly good. The small order is most prevalent, car loads and tonnages up to 500 being the rule. One enquiry is for 2,000 tons, this being the largest. Prices are somewhat better than last week's.

Pittsburgh.—Foundry iron has had a good week, sales amounting to 25,000 tons being reported, while steel making grades are not in request. National Radiator, Union Radiator, and Standard Sanitary are the largest buyers. The latter firm has an enquiry for 10,000 tons for July-August delivery on the market.

Philadelphia.—The business done in this district has not been up to expectations. However, as there is a good volume of enquiries, hopes are entertained of a better week this week. Prices are not holding firm, quotations covering a wide range.

Cleveland.—Heavy bookings have continued during the past week foundry and malleable grades being the favored ones. An aggregate of about 100,000 tons has been sold, which is about half the total amount since the buying movement began. There are large inquiries on the market, but steel making grades are not asked for.

Buffalo.—Heavier shipments and large sales have been the feature here. The selling amounts to about 100,000 tons in the aggregate, and at least one interest has increased its prices on low silicon grades.

Cincinnati.—There is not much business being transacted in this district, although inquiries are numerous. Consumers seem to be well provided for last half business.

St. Louis.—The movement in pig iron seems to be getting stronger, although not as yet very active. There have been a number of small sales, while some good sized contracts for second half have been made. The week's sales will total about 5,000 tons.

THE GERMAN U. C. 97

(Continued from page 681.)

air compressor, also motor driven, the function of which is to act as a booster. Air can be taken from the discharge side of the main compressor at about 600 lbs. per sq. in., and delivered from the auxiliary compressor at about 2,300 lbs. per sq. in., for discharging torpedoes.

Other Features of the Boat

In the small space aft of the engine room there are sleeping quarters for four men. It must not be supposed that this space is devoted entirely to accommodation, for it is not. Part of the space is occupied by an oxygen tank, the use of which when submerged for lengthy periods will be obvious.

Going forward from the engine room one passes through a further space partly devoted to sleeping accommodation. Before reaching this, however, there is noted at the forward end of the engine room, on each side of the vessel, the "Kingston" valves for flooding the tanks and submerging.

When manoeuvring on the surface these tanks were left full open, the air vent from the tanks being closed. Thus if a speedy dive were necessary all that was required was to open the air valves, when the tanks would immediately fill and what is known as a "crash dive" would ensue. That is practically a dive at full speed, exactly as a man diving from a spring board would enter the water.

There are four bunks in this space, and the men in the two top bunks must be very careful how they raise their heads or they will knock them on the cluster of valves immediately above. This is an impressionistic sketch, so I am not going to attempt to say what these valves are for. However, I did notice a label on one which read "kalte wasser," and I judged rightly that it led to the water service of the engine.

The Central Control

From here one goes forward to the principal compartment, known as the central control. This is directly under the conning tower hatch and is where the periscope is located. Directly to the port side and ahead of the periscope is the navigating compass. All around are telegraphs, gauges and pilot lights. There is a little more room here as the control chamber occupies practically all the beam of the inner hull. When we say room we mean two men can move without passing through each other, which can't be done anywhere else. All the necessary operations for submerged navigation are controlled from this part, which is practically the brain of the craft.

Just forward of this room are the sleeping quarters of the officers. These, like the men's, are merely bunks fitted up on the vessel's sides, amidst cables and pipes. Forward again are the torpedo and mine tubes.

The writer emerged from the forward hatch feeling a great respect for the men who can keep the sea for days together under war conditions in craft of this kind. At sea one gets accustomed to discomforts, but the absolute confinement of a craft of this kind must be trying in the extreme. Add to this the feeling that any moment you may be drowned like a rat in a trap, and there is small wonder that men's morale became weak. One wonders still further how men who had the fibre to keep the sea under such conditions could be guilty of the brutal crimes they undoubtedly committed.

One gathered that on the voyage from England the "U.C. 97" behaved well. She rolled very heavily, and lost her diving rudders in the heavy sea, they not being designed with a view to ocean travel.

The starboard engine developed piston trouble, but the port engine ran for fifteen days without a stop. One of the pistons from the starboard engine was on the platform, showing a crack across the head. These pistons are not oil cooled, and probably the cracking was due to overheating.

I asked one of the young chaps on deck as to the extent of the rolling. He assured me solemnly that "she rolled from 65 to 70 degrees."

He Swats the Metric System Hip and Thigh

Fails to See Any Good Reason for Agreeing to a Change Being Made

By DONALD A. HAMPSON, Ass. Mem. A.S.M.E.

IN the June 5th issue of CANADIAN MACHINERY, a correspondent writing on the progress of the metric system, calls attention to the fact that a year's saving would result by the abolition of the old system of measurements. This has long been one of the strongest planks in the metric platform, one that is swallowed hook, line, and sinker by the hearer who is a hearer only, not a thinker.

Down in New York city they went to work to see if this were true and carefully tabulated the mathematical work each scholar must perform during the entire years of the course. The result showed up the rashness of the "year's saving" claim, for the entire time devoted to such work in the grammar school course hardly totalled more than a year. And a little thought by any one will quickly prove this to be so. There is no denying that there would be a slight saving in time, but that saving would be entirely on the reduced number of tables to be memorized—and at the age when most children are learning these tables, they can memorize the whole batch in a week's time.

Adoption of the metric system would not abolish for an instant the importance and the use of addition and subtraction, involution and evolution, factoring and percentage, and a dozen other subjects in arithmetic including fractions—fractions that are so despised and yet so useful. And then on into algebra and the geometries—how much would actually be saved there? The real purpose of study is to stimulate thought, and the seemingly long course in arithmetic covers the least possible number of subjects to give pupils a general knowledge of the underlying science, upon which the scholar may build his structure into any special branch he may select in his higher education. The metric system, besides decreasing the number of tables to be learned, might save—yes, it would save—time by shortening the work of calculations of the sort where a decimal point could be moved.

But actual practice does not show these cases as a rule: for instance, there would be no saving in the calculations of Smith's last Western trip because he travelled 3,408 kilometers at 3½ cents per kilometer over the figures if he had gone 5,126 miles at 4 cents a mile—Smith, by the way, is our carburetor salesman, and he sells them for $5.46 each (the very least we can get them out for) and on the trip mentioned he sold 2,803 of them to 187 dealers and garages. There is a typical example of practice—figures as taken from the books. If there is a metric enthusiast present who can show us where the system will save anything on that job, let him stand up.

The long, laborious work of the arithmetic class has another end in view—that of speed, smoothness, and accuracy. Practice makes perfect and if the scholar was told that the shifting of a decimal would do his multiplying and dividing and was given little or no practice with those branches as they do occur in the hard, cruel world, what a sad awakening he would have "when he got old enough to go to work," and how swift and correct his calculations would be. All that laborious work of the school days with the arithmetic "as she is" go to make the scholar's work correct—the practice so acquired is just like the running-in that any worthwhile machine gets before it is sent out—it smooths out and breaks down the little roughnesses and locates the weak points, the absence of which process would utterly condemn the product in the world of commerce.

The correspondent stated that he had to look up the tables in the arithmetic to determine the value of the rod and certain other units of the surveyor's system. That certainly is no argument for the metric system—in all probability the said correspondent is not a surveyor and like millions of others who eke out an existence by means other than the transit and chain, he has forgotten the exact wording of something he learned twenty years ago—take the grammar and the geography and the physiology that were carried through the same period of childhood and try the same experiment with some exact point in those subjects to see if the memory has not rusted a bit. It is the lack of use rather than the difficulty of the system; a surveyor has no trouble in keeping rods separated from acres, but he would very likely stumble on the units of apothecaries' weight which he learned at the same time that our correspondent was memorizing surveyor's measure.

It has been truly said that people will sign any kind of a petition. Also when any reformer or schemer or long-haired gent proposes a different way of doing things he collects a following and gets more or less newspaper space—he gets notoriety for himself, probably a living, and usually gets some legislator to introduce a bill saddling the new and odious thing upon the public. Because this individual has some axe to grind and the rest of the world has a living to earn (and is almost too busy to notice every fool thing propounded) the said legislation flourishes and is fastened upon us before we realize the evil of the thing.

The metric system is not necessarily bad, but its advocates "work while you sleep," and they do not present things as they really occur in practice. The actual shortcomings of the established system are not as glaring as presented nor will the advent of the metric system suddenly resolve the world's work into a millennium of fives and tens. Offhand, anyone might be excused for hailing the metric system as a cure-all on hearing a certain side glowingly presented. But just consider a few facts and judge whether they do not favor the English system when the light is flashed into every corner—much as the year's school saving can be proven misleading.

As to world commerce. France and Germany are the two foremost metric countries. Germany is mostly down and out. France (if we can believe newspaper pleas for money) has no money to spend for goods from other countries and needs all her energies for years to come to upbuild her own country before entering the world's markets. England and possessions are positively anti-metric—so much so that a group of wise and competent men who have been investigating the matter for two years with a view of a bigger world business have reported finally and absolutely against the metric system. Outside of the three countries named we have a score of smaller nations who are supposed to be rather metric. The American Society of Mechanical Engineers has never actually gone on record as favoring either system, but it has conducted exhaustive investigations in these countries and with American exporters to them and the findings are overwhelmingly in favor of the English system. These findings are to be found verbatim in the society's transactions.

As to the saving in the time of schooling. This has already been surveyed. But it should be added that departments of education make a serious mistake in allowing teachers to falsely boost the metric system. I, with millions of others, was taught that the system was a

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	.....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$20 50	$19 25
Electro copper	19 50	18 00
Castings, copper	19 50	18 00
Tin	56 00	55 00
Spelter	8 50	7 50
Lead	7 00	6 50
Antimony	9 50	9 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.
Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under 40%.
4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$12 50	$12 00
Copper, crucible	16 50	15 00
Copper, heavy	16 00	15 00
Copper wire	16 00	14 50
No. 1 machine composition	12 50	14 00
New brass cuttings	9 25	9 00
Red brass turnings	10 00	9 00
Yellow brass turnings	7 25	6 50
Light brass	6 00	5 00
Medium brass	6 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 50	4 00
Tea lead	3 50	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 75	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	12 00	12 00
No. 1 machine cast iron	18 00	15 00
Pipe wrought	8 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	14 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd. brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and emi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts,	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sies up to 52	40
S.S. drills, wire sizes, No. 53 to 80	40 plus 10
Standard drills, al sizes	40 plus 10
Taper shank drills, plus	10
Jobbers' and letter sizes	40 plus 10
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Screwdrivers	50
Shovels	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	20 to 50
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized		
Queen's Head, 28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28		
Premier, No. 28 U.S.		7 95
Premier, 10¾ oz.		8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B. ⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.99.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Nicholson	50
Pill and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	19½
Royalite, per gal., bulk	22½
Palacine	27½
Machine oil, per gal.	16
Black oil, per gal.	52
Cylinder oil, Capital	39½
Cylinder oil, Acme	
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11
Dark colored	09
Mixed colored	10

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

panacea for all mathematical evils; at that age, scholars necessarily have to take things for granted as they are taught and I came to look on the world as all wrong because houses were not made with just ten windows and cities were not all spaced so many meters apart.

As to the shortcomings of metric measurements. In the first place, it is admittedly a system founded upon a wrong unit—the 39.37". Why a foot, or a hundred inches or a mile should not have been the basis of linear measurement will always remain a mystery. There is no more logic in the selection of the meter as it is than if the distance from Toronto to Quebec had been selected and some divisor of this adopted as the unit of length. A straight decimal system based upon time-tried units such as feet, cubic feet, and pounds is far ahead of the metric system and if we are ever going to make a change, let that change be logical, sensible, and sane. Should a new world be opened up to-morrow, the metric system could be installed without the slightest hitch and it would have some advantages over ours, but the forced, or voluntary adoption by the nations of this world would plunge it into a state of chaos. Unless every building and machine and public work and labor-saving device were immediately scrapped, we would have the old sizes coming up for a hundred years.

Considerably over a century ago the metric system was introduced in France and for the greater part of that time it has been obligatory, but to-day the old units are in extensive use. Silk is France's greatest industry and it was supposed to be converted a hundred years ago; Paterson, N.J., is the seat of the silk business in America and Paterson men in the Army visited the French factories after the armistice, but strange to state, they report on their return to this side that the yard and other English measurements are in as common use in those factories as in the American ones.

As to the case of conversion to metric units. School children would have no trouble in familiarizing themselves but it is the men and women of mature years whose minds are not elastic that will be confused. To them—the workers and buyers of the world—the separation of deki from deci, milli from hecto, centi from kilo and the unfamiliar meters, liters, and grams will cause endless confusion. The good old feet and inches, pounds and ounces, quarts and gallons are names so short as to be easily remembered and quickly spoken—they are distinctive, so much so that they live in one's mind, they are actually related to and inseparable from the unit itself—a fifty-year mechanic does not have to stop when he sees 582 M.M on a drawing and, scratching his head, slowly conclude that "let's see, deci means ten, millimeter means ten more, 582 millimeters is 582 tenths."

As to inter-relation of units. In the matter of feet and inches, there is at present no conflict and no confusion. To measure 40' 6½" along the wings of an airplane is as simple and quick as to measure it as 12379.13. M.M. or 12,379 M.—the feet and inches way is as short to speak or write as the other; it is only in the conversion to units of a higher or lower denomination that there is a metric gain—but how often is this conversion actually required, let me ask? Is the saving on that rare occasion worth while to upset our entire system? And as to similarity between names and progressions with different scales, this is only a talking point of the theorists. The chemist doesn't care what system the banker uses, machinists do not worry about surveyors' businesses, coal dealers have nothing in common with those who deal in liquids. Just as the great mass of people have no use for a foreign tongue, and have forgotten what they ever knew of one, just so is each man independent of his neighbor and of the language of his neighbor's business.

And as to machine shop. There is no business in this world that does not touch the machine shop at some point of its career, so it follows that the shop's relation to the metric system is the most important of all. The fact that the shops of America have made untold numbers of parts to metric measurements in the last five years is no argument for the system. Machine shops can make anything, to any system of measurement. Metric scales and metric drills have been stock parts for years. Brown & Sharpe make some of these metric parts—they have made the Government standards for the most of the metric countries—yet we find the members of this firm among the most active in denouncing the adoption of the system.

Brown & Sharpe may be looked upon as the cornerstone in the system of machine shops in America. The firm of Sellers & Co., of Philadelphia, and that of Whitworth, in England, may be regarded as truly representative: both of these adopted the metric system for a period of ten years in an unprejudiced effort to ascertain what was best **and both abandoned it.** If there was no other testimony at all, that furnished by these three representative concerns—who serve the world—should outweigh that of a handful of enthusiasts whose work begins and ends within a fifty-foot circle.

There is one department in the business with which the writer is connected that produces annually $200,000 worth of appliances sold througout the American continent. All of these have renewable wearing parts—bushings, pins, and slides—which we keep in stock for replacement for the various designs. Orders for replacements for the goods sold in 1903-4 have begun to come in within the last year or so; previous to that the repair business did not amount to $10 per year. The life of these (or any other tools) can only be gauged by actual service: the renewal of simple parts makes these appliances good for another fifteen years and a further renewal extends the life to a grand total of forty-five years, if the owner chooses to scrap at that time. Right there is one of the strongest arguments against the adoption of another system of measurements—it is the point on which the public is most concerned.

This instance from real life is just a flea bite to the entire commercial world. Consider the automobile: everyone knows the difficulties of getting repair parts for them, yet the manufacturers are the strongest financially and have the most efficiently run departments of any industry to-day. Would the adoption of the metric system in part or in whole salve the feelings of the car owner who "has had his troubles with repair parts?" The auto has done more to bring the public in touch with mechanics than anything since the advent of modern plumbing. Suppose there is metric compulsion and we cannot longer get wrist pins for our 1916 flivver, plumbers cannot supply one-inch water pipe and ¾" faucets, printers cannot get parts for their presses and linotypes, builders are not allowed to plane boards an inch and a half thick, coal men dare not sell a ton of chestnut, and railroads must discontinue that "impractical" 4' 8½" gauge of track. Then we must sell our flivver for junk, re-pipe our house entirely, printers must buy new and inexpensive (?) machinery or tie the disabled parts up with string and paste, tear out half a building to have all doors and walls match the new thicknesses of lumber, coal men must put in new scales reading to liters (oh, beg pardon, I should say kilograms), and the railroads must rebuild every piece of rolling stock and every mile of track. It is either that or maintain two standards for fifty or a hundred years. Where is the saving and where is the gain? What becomes of the high cost of living?

As compared with facing such a front, that of the Germans was only a starter. There is the machine shop argument—it touches every man, woman, and child for a century. It is said that the engineering calculations under the metric system would be vastly shortened. In a majority of cases, it would actually be but a fraction of one per cent. Those old 8's and 9's would creep in just as often, and iron and cement would still bear their same relation in the scale of gravity, and moments would have to be found by multiplying grams and meters. Where there was a minute's saving by shifting the decimal point, it would be swallowed up by the time spent in the conversion of some data available in English units, but not yet translated to metric, and not likely to be for ten years to come.

And finally, the incompleteness of [illegible]. After we had absorbed the present metric system, we might begin to look around. Then we would find that our system of time had not changed and our watches continued to serve up twenty-four hours to the day, there still would be degrees of latitude and longitude, the surveyor's transit and the machinist's protractor would be cold blooded in their persistence of dividing circles into 360 degrees, twelve months would constitute a year and thirty days a month (horrible to contemplate), each dollar would be made up of a hundred cents and other subdivisions without Frenchy names, printers would be setting type to pica measurements, and so on ad infinitum. Truly, our metric friends have overlooked much in their straining at a gnat to swallow the camel.

THE season for pickling and preserving draws nigh. Then will the head of the house find his shaving mug filled with jelly, and his favorite razor peeling the small onions. Great days, them!

U.S. Government sold airplanes and realized 13 per cent. of the original cost. And we rise to remark that money can likewise take to wings without tinkering with the airplane business.

REPORTS tell of a little child being drowned by falling into an open rainbarrel, sunk in the ground. Of all fool traps for children, the open cistern heads the list. It belongs in the same category as the idiot who rocks the boat, or the very well-intentioned young chap who shortly before his funeral gazed down the barrel of a gun, and didn't know it was loaded.

A GOOD Yankee named Liar has had his name changed. Well, he may quit the name, but there's quite a heap of other folks ready to work on the job.

OUR idea of a real jackass is the old fossil weighing 250 who imagines he can go to a picnic and run the 100 yard fat man's race in less than half an hour.

WHO IS BLIND?

Will every person who reads this notice, and knows a blind man or woman anywhere in Canada, kindly send the name and address of that blind one to the Canadian National Institute for the Blind, 36 King St. East, Toronto.

The institute is conducting work for the blind along the most modern scientific lines and desires that each blind resident of Canada should have the opportunity of availing himself or herself of the benefits represented by this work.

The immense task of registering every case of blindness can only be accomplished successfully by the earnest co-operation of the public generally. That is why we ask you to send the names and addresses of blind people you may know.

The following departments of work are being actively prosecuted by the institute:

Industrial Department for Men.
Industrial Department for Women.
Department of Field Work.
Department of Home Teaching.
Department of Prevention of Blindness.
Library Department.
Department of After Care.
Residence and Vocational Training Centre for Blinded Soldiers.

To send information or obtain information, address the General Secretary, Canadian National Institute for the Blind, 36 King St. East, Toronto.

Large Foreign Order.—Armstrong, Whitworth of Canada, Ltd., with works at Longueuil, Quebec, have just completed one of the largest individual orders for steel tires placed this year, covering 3,000 tires, placed by the Netherlands Government, New York office, for shipment to the Dutch Indies. These tires were manufactured from raw materials at this company's works at Longueuil. The steel was made in Heroult electric furnaces, and the tires were manufactured with the equipment installed early in 1918 when the tire and wheel plant was added to the present works at Longueuil. This is a concrete example of what Canadian manufacturers can do to secure foreign trade, and the success with which this order was handled by this company has acted as an impetus to further developing foreign trade. Needless to say, the Netherlands Government assured themselves of the very high quality of steel tires which this company are making before placing the order in their hands, and it should be a source of gratification to Canadian manufacturers to know that markets heretofore controlled by Germany can be secured.

Add to Algoma Plant.—Further important extensions in the Canadian steel industry are foreshadowed in a decision just made by the Lake Superior Corporation to begin work immediately on an extension of the rail mill of the Algoma Steel Company's plant at Sault Ste. Marie, Ont. The purpose of the extension is to make possible the production of structural steel up to 23 inches. Work will be begun at once, and the extension will cost several hundred thousand dollars. It is expected to be completed by November. It was stated yesterday that this is but the first step in a considerable development of the plant with a view to further caring for the Canadian market for this form of steel product, and that the ultimate scheme will be on a large scale. The present extension is not made with any understanding with the Dominion Government, but is said to be based on the expectations of the market for Canadian produced steel, which is expected to extend on a large scale. The rail mill of the Algoma Steel Company is now running at about 46 per cent. capacity, and the other portions of the steel plant are going at about full capacity.

British Forgings Sold.—The negotiations with Baldwins, Ltd., the Welsh tinplate makers, for the purchase of the British Forgings plant in Toronto, and the establishment of extensive works for the production of tin plate and other products on a big scale have been brought to a successful conclusion, according to a statement by R. Home Smith, member of the Harbor Commission, on whose property the plant is to be located. Details are for the present lacking, according to Mr. Smith, who explains that the deal was completed following negotiations with J. C. Davies, representing the company, who was in the country for about a month conducting his inquiries. The matter has also been taken up in England by Sir Joseph Flavelle, chairman of the Munitions Board. The enterprise promises to be one of the most important in the country. It is proposed to expend between two and three million dollars on plant, and a couple of thousand men will be employed at the outset. Much will depend upon the treatment of the company and its interests as to future expansion. Toronto has not offered much encouragement to big business in the past, and it is to be hoped that there will be a change of attitude in this case.

NEW COUNTER SIGN

The Wilt Twist Drill Company of Canada, Limited, Walkerville, Ont., have issued a very attractive counter sign. This sign, which is intended for distribution to the trade, can be used either as an easel or hung on the wall. Those who are selling Wilt products will find this a very attractive means of keeping the Wilt name before the buying public.

Leather Prices High.—Owing to the depletion of stocks of tanners in Canada, caused by the lifting of the British embargo to Canada, while the American embargo continued, prices have advanced materially. Tanners are exercising extreme caution, as they feel that the high prices may come down materially during the next few months, and are, therefore, unwilling to speculate on the future values. They are, therefore, keeping operations down, and this combined with the scarcity of raw materials, tends to keep the prices firm at their present levels.

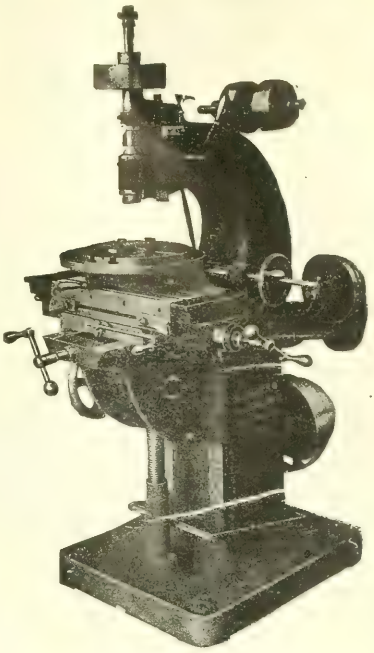
BECKER

Belt Driven Millers

The Machine that Gives the Smooth Finish

Stringent shortage of labor during the war put a premium on machinery of superior productive ability. Never was the capacity and value of Becker Millers better emphasized than during that period. And Becker Millers will always continue to demonstrate their ability to return maximum production for minimum expenditure of manual effort.

Send us blue prints of your work and other data and we will submit estimates on Becker production. Adopt this "safety-first" course; it may mean added profits to you.



The A. R. Williams Machinery Co.

LIMITED, TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

MORROW SCREWS MORROW

DRILLS FILES

MORROW NUTS MORROW

MORROW INGERSOLL

In assembly you should use only the best "Morrow's."

Best Jobbers carry "Morrow's."

Set Screws, Cap Screws—"It's the finishing die that does it."

Nuts (every variety of finish).

Twist Drills, "will do more drilling with less regrinding."

Order Ingersoll Files from us, "they cut faster and wear longer."

John Morrow Screw & Nut Co.

LIMITED

INGERSOLL - CANADA

Always, everywhere, use "Morrow" products. Made just a little better than seems necessary.

STORAGE OF COAL AND SPONTANEOUS COMBUSTION

Coal should be stored in small quantities as near to the point of consumption as possible. Small coal piles rarely ignite from spontaneous combustion. Coal should be stored near the point of use to avoid re-handling, extra transportation and the degradation of size which follows same in handling. For these reasons the bureau would advocate storage, so far as possible, in the bins and yards of the ultimate consumer, thus dividing the risk of loss from spontaneous combustion. If large storage piles are necessary, certain general principles must be borne in mind. The generation of heat is the result of slow oxidation of the coal surface. The oxidation is much more rapid from freshly mined coal or from freshly broken surfaces. The oxidation rate increases rapidly with increased temperature. Different coals have different oxidizing rates. These facts lead to the following recommendations:—Where there is choice of coal to be stored, that having the lowest oxidizing rate should be chosen, if known. Between two coals, that which is least friable and therefore which presents the least total coal surface in the pile, should be selected.

The method of handling should be such as to produce the least freshly broken coal surface. The coal should be as cool as possible when piled. Piling warm coal on a hot day is more likely to produce spontaneous combustion. The coal must be kept from an extraneous source of heat. Alternate wetting and drying of coal during piling is to be avoided if possible. The fine coal, or slack, is the part from which spontaneous combustion is to be expected. Piling of lump coal where possible is therefore desirable.

In the process of handling, if the lump coal can be stored and the fine coal removed and used immediately, the practice prevents spontaneous combustion in coals which would have otherwise given trouble. The sulphur content of coal is believed by many to play an important role in spontaneous combustion. The evidence on this point is still conflicting, but to play safe, it is desirable to choose coal having a lower sulphur content when choice is possible.

There is a current belief that dissimilar coals stored in one pile are more liable to spontaneous combustion. The evidence on this point is also conflicting, but to play safe it is advisable to store only one kind of coal in a pile. The ground on which a coal pile is built should be dry. The foregoing recommendations are all derived from the factors affecting the heating of coal. There should be no spontaneous combustion, whatever the heating rate, provided the heat is carried away as rapidly as produced. This fact brings about the following recommendations:—

Coal piles should be made that there is ready movement of air for ventilation [illegible] of the coal pile. This is the condition when the entire pile is made of coarse lump coal. With ordinary coal piling this is difficult. The surfaces of coal piles should be so exposed as to allow the pile to cool; or else the coal should be so stored that air circulation within the pipe is very small. When the air circulation is reduced to a minimum, as in air-tight bin, with no opening in the bottom, the oxygen of the air is soon removed and the mass of the coal lies in an inert atmosphere, except for small local circulation near the surface. Air-tight bins are usually impracticable, but the following practice is recommended to approximate these conditions:—

In making a coal pile of mixed sizes, the coal should be so handled as to make a homogeneous pile and prevent the segregation of coarse and fine coal. This frequently determines the most desirable machinery for unloading coal. It is common practice to limit the height of a coal pile, this for two reasons:—A pile too high crushes the lower layers of coal, producing more fines; the larger the pile the less the heat-dissipating surface there is exposed in proportion to the heat generating capacity of the pile. Twelve feet in height is a common limit.

Whatever precautions are taken in choice and handling of coal, provision should be made for keeping track of the temperature rise in a coal pile and for rapid rehandling of portions of a pile in case of excessive heating. In a coal pile covering considerable area, it should be so subdivided that in case of spontaneous combustion of a portion, the heat will not be transmitted to the whole pile, thus accelerating the heating of portions of the pile which normally would have remained cool.

To keep track of the temperature of coal piles, it is recommended that ½ in. iron pipe be driven vertically into the pile at distances of 15 ft. or 20 ft. apart. A maximum thermometer lowered into the pipe to varying depths will indicate the temperature of a pile opposite the thermometer.

A survey of the pile and a survey of the temperature of all parts of the pile. Actual removal need not begin during the first three months after the pile is made, and once a week thereafter until the pile has evidently ceased to heat. As soon as any portion of the pile reaches the temperature 150 deg., provision should be made for removing that portion of the pile. Actual removal need not begin until the temperate has reached 180 deg., but at these temperatures the rate of oxidation is dangerously rapid. The object of rehandling the coal is to allow it to cool below a dangerous temperature. Any method of rehandling which does not allow of cooling will only transfer the difficulty from the old pile to the new one. It is usually useless to employ water in an attempt to cool a coal pile.

Lack of provision for rapid reloading, cooling, and repiling of coal is the cause of serious loss from spontaneous combustion.

BUYING PIG IRON

THE buying movement in the pig iron trade continues to develop. Booking of foundry and malleable are heavy, and there is some demand for steel making grades. Following are reports from various centres:

Chicago.—Active trading is the rule in this district this week, and buyers are coming into the market in good shape. One sale reported was for 12,000 tons foundry iron. Malleable is beginning to figure in the enquiries, and for larger quantities than usual.

New York.—With sales active in all grades, but chiefly in foundry, a week of trading has been concluded that outclasses the four previous weeks. Total business in foundry iron amounted to 50,000 tons, and enquiries for as much more are on the market.

Buffalo.—Enquiry is so strong and actual business in such volume that some interests are contemplating increased production. Some enquiries are for first half of 1920. Sales amount to approximately 125,000 tons foundry iron, and there are enquiries for about 30,000 tons.

Pittsburgh.—A good amount of foundry iron has been sold during the week, in most cases in small lots. There is a scarcity of heavy melting scrap, and the shortage is made up by using more pig iron. One firm is looking for 3,500 tons basic for spot and July delivery.

Boston.—The buying movement, while not so evident here as elsewhere, has been sufficient to create a demand that has had the effect of stiffening prices. One sale of 3,000 tons of high silicon is reported, and 2,000 tons malleable are expected to be placed this week. Prices range from $28.75 to $29 for No. 2 foundry.

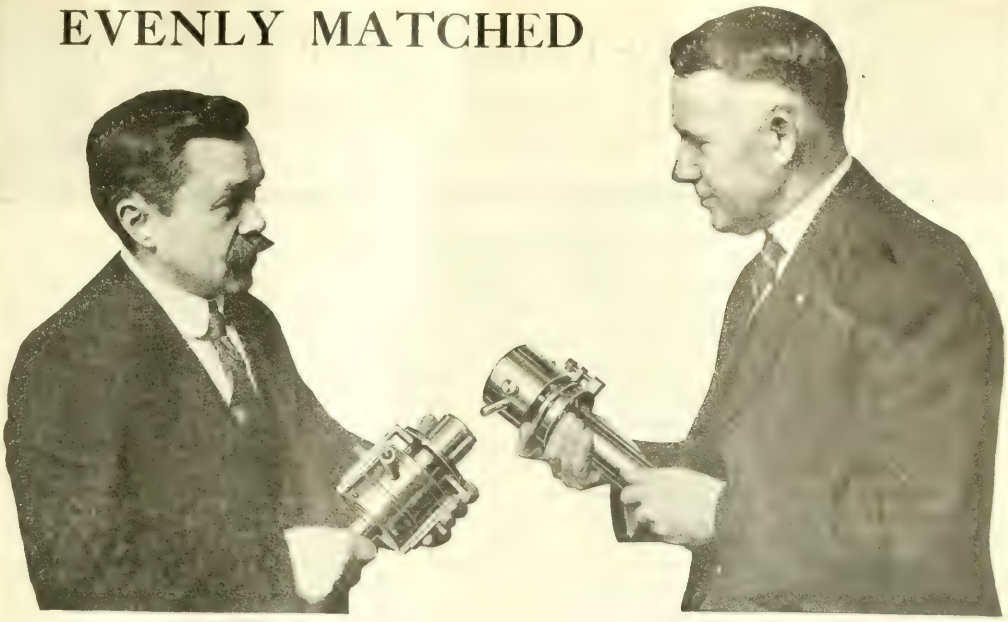
Philadelphia.—Demand is not very brisk, compared with other districts, but dealers state their total is above the average of any month this year. Furnaces are taking iron only for future delivery, and some are piling iron in the expectation of better prices later. Prices for iron on hand show a slight concession.

Cleveland.—Large sales of foundry and malleable amounting in the aggregate to 100,000 tons is the result of the past few days' business. New inquiries for malleable and foundry grades are plentiful, though there is little inquiry for steel making grades.

St. Louis.—Improvement is being shown in this district, and one sale of 2,100 tons No. 2 Southern is reported. Inquiries for third and fourth quarter are coming out.

Birmingham.—Lower prices and good demand are the prevailing conditions here. Prices have been affected by the absorption of freight rates by some sellers. Rates are from $24.50 to $25.75 according to grade of silicon.

EVENLY MATCHED



The man who is tapping internal screw threads with a Geometric Collapsing Tap is evenly matched with the one who is cutting external screw threads with a Geometric Self-opening Die Head.

Commenting on the policy of THREADS, the monthly publication of The Geometric Tool Company, a London supporter of the Geometric method, says:

"The policy you advocate as to work is good, yet you are inconsistent in making a tool that avoids it."

Geometric Self-Opening Die Heads and Collapsing Taps

Help You to Avoid Work by Doing it for You

The Geometric Catalogue will tell you how

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents: Williams & Wilson, Limited, Montreal; The A. R. Williams Machine Co., Limited, Toronto, Winnipeg and St. John, N. B.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES



TRADE GOSSIP

A New Alloy.—It is reported that a new alloy has been discovered that is lighter than aluminum. The alloy is being used in the manufacture of airplane piston rods for the Italian army planes by a firm in the Province of Quebec.

No Work on C.N.R.—No work will be done on the line of the Toronto and Eastern Railway this year by the Canadian National Railways. There is no money available for this purpose. Some time ago the Government stated that it would dispose of the road to the Ontario Hydro, but nothing has been done along this line.

New Company Starts.—Statement was issued at Toronto City Hall, that the Nukol Company had taken a lease of the property formerly occupied by Toronto Shipbuilding Company. The lease, which was issued by the Harbor Commissioners, is for 21 years. It occupies some 2½ to 3 acres. The company is importing machinery from Belgium, and will start operations in making Nukol as soon as it is installed.

Hamilton.—The Steel Company of Canada, which closed one of the open hearths at its local plant a few weeks ago for repairs, has reopened and about fifty hands were put to work. The force was further increased later. Two local plants asked the local branch of the provincial labor bureau for about 40 laborers, but not that many reported to the office. They will be secured later.

The Jeffrey Manufacturing Company, Jeffrey, Columbus, Ohio, have issued catalogue number 210 on the Jeffrey Pivoted Bucket Carrier, well illustrated with engravings and forming an unusually complete treatise on the subject of conveying. In addition to the many illustrations showing typical installations, line drawings are given which show practically all the dimensions necessary for the complete installation of this type of mechanical conveyer.

Veteran Contractors.—A firm of contractors has recently been formed in Vancouver, the members of which have seen service in France on railway work. They have taken a contract for one and a half miles on the Copper Mountain Railroad near Princeton. They will, as far as possible, employ none but returned men, and the wages paid will be up [illegible]

men who stay on the work till completion a percentage of the profits will be given.

Sells Buffalo Plant.—The Russell Motor Car Company has sold its Buffalo plant, which was an important subsidiary during its operations on war contracts. It is said that the sale is an advantageous one, realizing more than the company put into it. It is reported that the company is having a successful year, and will close its fiscal year on July 31, with a good record, though somewhat less earnings than in the bumper period before the close of the war.

Business Change.—The Monash line of pressure reducing valves and pump governors, formerly manufactured and sold by the Monash-Younker Co., of New York and Chicago, has been acquired by the Harrison Safety Boiler Works, of Philadelphia. The purchase includes a stock of manufactured parts and valves, drawings, patterns, trade mark, and goodwill. The Harrison Safety Boiler Works will manufacture and market the valves under the trade name "Cochrane-Monash," and will supply repair parts for valves now in use.

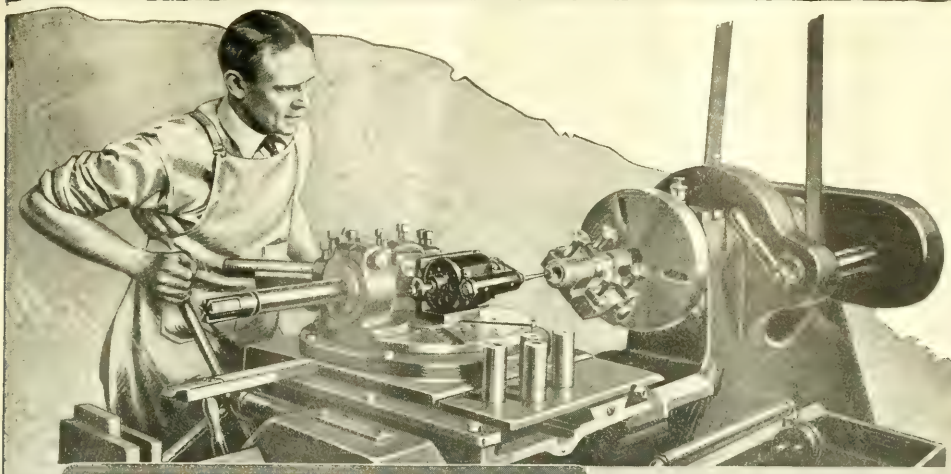
Strike Settled.—The strike of 175 shipworkers and helpers at the shipyards of the Canadian Allis-Chalmers Company's plant at Bridgeburg has been settled. The men returned to work following a consultation with officials of the company. Although not all the points asked for were conceded, the men get a wage increase of between 10 and 12 per cent., and a 48-hour week. Hitherto they had been working 60 hours. The company conceded several points to the men, and through the surrender by both sides of certain points the strike was brought to a close by a compromise. The strike lasted about three weeks. Not all of the big forces at yards, however, went out on strike, the electricians, plumbers, carpenters, etc., remaining on duty during the entire period.

Profit-Sharing Plan. — The Dominion Sheet Metal Corporation, one of Hamilton's largest industries, has inaugurated a profit-sharing scheme for employees. Eight per cent. preferred stock will be offered to the employees, the number of shares to be based upon earnings. The offer will be made at par, although the stock has been selling at from 110 to 112 in a limited way. The employees are to pay for the stock at the rate of 2 per cent. per month. They will be credited with the 8 per cent. dividend at the rate of 2 per cent. each quarter, and no charge will be made for interest or unpaid balances. The arrangement means 14 per cent. annual credit and no interest charge. All employees are also to have one week vacation, for which they will be paid.

Strike at Midland.—The Midland Shipbuilding Company has shut down its plant. A press despatch from Midland says:—After ten days of negotiations between the striking iron workers and the officials of the Midland Shipbuilding Company the plant closed down. The strike started on the 6th, when 175 men walked out because the company refused to grant a 44-hour week and an increased scale. Two proposals were made by the company: first, that the men take over the boat now under construction for the Imperial Government and work such hours as they decided upon, the boat to be completed by a named date, the men to receive their present wages in the meantime and a bonus at the appointed date. The other proposal was that the iron work should be completed for a lump sum, to be divided as the employees saw fit. Both offers were refused, and the plant is therefore closed down, affecting 305 men, who were drawing weekly wages totalling $9,000.

Welland "Telegraph":—The worst industrial blow Welland has ever received was in the decision of the directors of the Canadian Steel Foundries last week to dismantle the Welland plant and ship the machinery to Montreal. The work began on Monday and by the end of the week much of the equipment was on the way to Montreal, and the balance of it was loaded or being loaded on cars. A year ago this firm was employing about eight hundred hands.

It is stated that the land and buildings will be offered for sale at once. Prospects of sale, however, are very remote. The plant was built for a specific purpose, and unless for an industry of closely allied nature it would not be likely to prove suitable. The industry began a dozen years ago as the Ontario Iron & Steel Company, financed principally by Albany interests. It was agreed at the beginning that $200,000 would be spent in plant and that 100



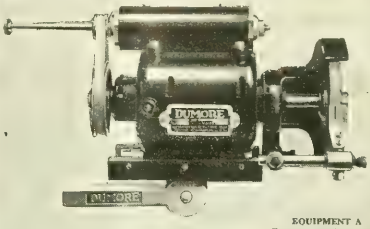
GRINDING HARDENED BEARINGS IN PLACE

STARTING and finishing this job with one set-up—from machining the casting to grinding the hardened bearing in place—is a good illustration of the **DUMORE** grinder on production. This method positively aligns each bearing with the rest of the machining, by tempering. And the danger of chatter-marks, taper or bell-mouth is eliminated because the **DUMORE** grinder is perfectly balanced throughout and gives correct cutting speeds to even small emery wheels. Limits of .0001" are easily maintained.

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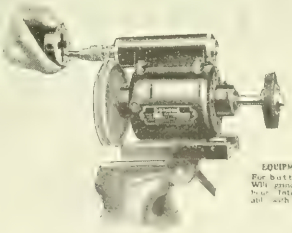
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For general tool room use. Includes High Speed Internal Spindle A with reach of 3 inches 10,000 R.P.M. Comes fully equipped. Weighs 17½ pounds.

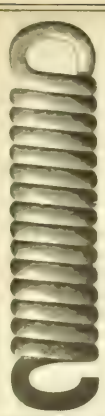


EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm interchangeable with internal spindle on Equipment A.



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LONDON, CANADA

...ld be completed. It had some years of bad ... and frequent ... before being taken over by the Canada Car and Foundry Company, the present owners. The company spent thousands of dollars in new equipment. They specialized on railway work, and their product annually was in excess of five million dollars. The company operate many plants —at Fort William, Amherst, N.S.; Longue Pointe, and Point St. Charles. It is believed that the closing of the Welland plant marks the first step in the consolidation of all the plants in Canada.

TENDERS

Tenders will be received up till July 10 for the erection of a four room addition to the Public School of Trenton, Ont. Plans and information can be obtained from S. B. Coon & Sons, architects, Excelsior Life Building, Toronto. The Department of Public Works are asking for tenders for the construction of Postal Station B, Hamilton, Ont. Plans and specifications can be obtained at the Department Offices, Ottawa, Superintendent of Dominion Buildings, Postal Station F, Toronto Overseer of Dominion Buildings, Central Post Office, Montreal, and the caretaker, Public Building, Hamilton.

The British Admiralty ask tenders for the purchase of a coal hulk now at Bermuda, with a coal capacity of about 3,000 tons. Mean draft, light, about 16½ feet, 335 feet long, 52 feet breadth. No engines, two marine return-tube type boilers. Tender forms can be obtained from the Director of Contracts, Admiralty, London, or British Senior Naval Officer, 44 Whitehall, New York, or Naval Store Officer, H.M.C. Dockyard, Halifax, N.S. Tenders due August 1.

INCORPORATIONS

Incorporation has been granted to the Booth-Coulter Coppersmithing Co., Ltd. The firm is to carry on a general foundry and machine shop, and to carry on business as founders, engineers, manufacturers and dealers in brass, copper, zinc, iron and other metals, and as machinists and smiths; to manufacture, buy, sell, trade in, deal in and deal with iron, steel, copper, brass, tin, zinc, and other metals or combinations or products thereof, and generally in hardware of all descriptions, machines and machine supplies and other goods, wares and merchandise. The head office is at Montreal, and the capital is placed at $100,000.

Letters have been issued incorporating the Ker and Goodwin Machinery Co., Ltd., Brantford, with a capital of $500,000, divided into 5,000 shares of $100 each. The purpose of the incorporation is that the company may carry on the business of manufacturing, selling and dealing in all kinds of articles made from mineral, metal or wood, including all kinds of machinery, machine supplies, tools and all articles and commodities, of which steel, iron, brass, copper, or any kind of mineral, metal or wood forms a part; to acquire and take over as a going concern the business now carried on at Brantford under the style and firm of Ker and Goodwin Machine Company, Limited.

MARINE

Washington.—A huge deal in steamships was recently consummated in New York when the United States Shipping Board sold nineteen steel steamers at an aggregate price of $27,821,120. The price per ton varied from $210 to $225 according to size. The board are now organizing a selling organization to handle the disposal of about 1,800 wood and steel steamers, the price of which will amount to $2,500,000,000. The board expect to realize a considerable profit over the cost of the Government in the first place.

New York.—A deal that has been occupying a good deal of attention during the past few months received its quietus the other day at a meeting in Hoboken. This was the proposition to sell to a British syndicate all the ships of the International Mercantile Marine which were under British registry. When the votes were counted it was found that out of a total of 608,593 shares, 560,072 were against the proposed sale. The voting occupied only half an hour, and the proceedings were conducted in absolute harmony, with a complete absence of the acrimonious discussion that has featured previous negotiations on the subject.

Thorold.—A collision in the Welland Canal resulted in damage to the sand steamer, E. Gunnel. The steamer colliding with her was the Fresco, and the collision occurred at a sharp bend near the Port Robinson bridge. The Fresco is owned by the U. S. Shipping Board, and her skipper is Geo. Cottrell.

Cleveland.—The downbound freight market is unchanged, more tonnage offering than cargo to fill it. Many steamers are coming down light, both the ore and grain movements being slight. The coal movement is also slowing up, shipments for last week showing a decided decrease.

Cleveland. — The steamer Gogebic, beached near Pie Island, Lake Superior, after hitting a rock, has been abandoned to the underwriters as a total loss. The vessel is owned by the Central Steamship Company of Fort William. She is 275 feet long by 40 feet beam and 19½ feet deep.

PERSONAL

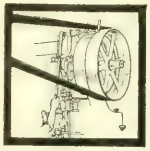
The Cleveland Milling Machine Company announces the employment of Mr. W. E. Miller as the Pittsburgh district manager. Mr. L. H. Mesker, vice-president of the Cleveland Milling Machine Company, has turned over the duties

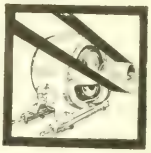
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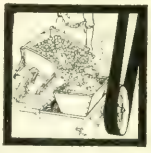


GOOD IN OILY PLACES


GOOD IN COLD PLACES

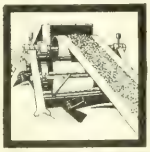
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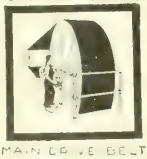
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GOOD IN DUSTY PLACES


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GOOD IN HOT PLACES




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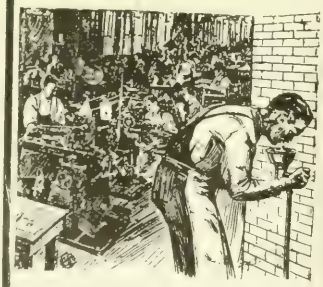
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The new French agency is the J. Horstmann Company, under the personal direction of Mr. Henri Nourry, who is a member of the firm of J. Horstmann.

His many friends throughout the country were grieved to learn of the death at St. Michael's Hospital of J. Frank Brown, following an operation for appendicitis. Deceased was the second son of J. F. Brown, 143 Dowling avenue, Toronto, was 21 years of age, and before enlisting with the 1st Tank Battalion was metallurgist chemist at his father's plant. Brown's Copper & Brass Rolling Mills, New Toronto. He received his education in the Separate and Technical Schools, was well known in athletic circles, and was an accomplished musician.

Col. H. J. Lambe, D.S.O., who has lately returned, after four years and eight months' service overseas, and who for many years has filled the position of District Engineer of the Department of Public Works of Canada, has been promoted to the position of the Superintending Engineer of the Province of Ontario, with headquarters at Toron' As such, Col. Lambe will maintain for the Dominion Government the general supervision of all harbors and rivers in this province. Col. Lambe is a graduate of the Royal Military College of Canada; a member of long standing of the Engineering Institute of Canada, and is president of the Royal Military College Club.

BOOK REVIEWS

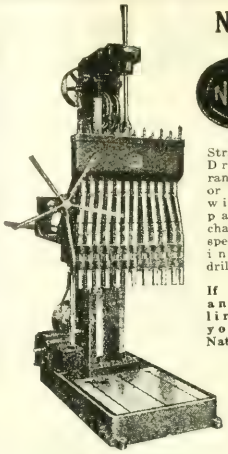
"Automobile and Aero Engines," by Rene Devillers, translated by Wm. John Walker, E. and F. N. Spon, Ltd., London and New York. Price 16/10.

Industrial progress and technical literature follow closely parallel lines, and where marked progress has been made in any branch of science it is necessary that recent knowledge gained by the few should be widely disseminated if stagnation is not to result. The war has witnessed a phenomenal advance in the theory and construction of the internal combustion engine as applied to land and aerial transport, and the author of the present work has achieved a high degree of success in the arrangement and choice of his material and in the bringing of the technical literature of the subject up to date. It may be mentioned at the outset that the work is not a mere collection of half-tone engravings and descriptive matter but is a well thought out treatise on actual design. Mathematics is necessarily called into extensive play, and indeed forms the groundwork of the whole structure. Much of the analysis comprised within the pages of this volume has as yet received little or no attention in any published textbook or periodical dealing with the subject, due, no doubt, to the restrictions placed upon such publication by war conditions. Calculus has necessarily been introduced into the many formulæ, but the treatment is exceptionally clear and lucid. Particular attention is drawn to Chapters IV, XII, XXIII and XXIV.

The first two, on the subjects of inertia forces and cams respectively, are dealt with in a manner which compel admiration for the author's lucidity of exposition. The expressions obtained in Chapter IV for piston velocities and accelerations although not new, are elegantly obtained and their connection with the corresponding expressions for the Desaxee engine, given in Chapter X are readily apparent. Chapter XXIII deals with the adaptability of power available to the power required for aeroplane sustentation and propulsion. This, besides opening up in excellent fashion a comparatively new field for future investigation, is interesting as a record of recent progress made in France in the economics of aeroplane power supply.

In Chapter XXIV, on the principles of super compression and super charging, analysis of these problems are given which will appeal strongly to the student interested in such matters. All French units have been transformed into the corresponding English units. For those wishing a sound and intimate knowledge of the design features of aero and automobile engine design the book is commended. The following gives a synopsis of chapters not mentioned above: The Working Mixture—The Laws of Gases and Their Application to the Working Mixture—The Four-Stroke Cycle—The Engine Turning Moment—The Cylinder—The Piston, Piston Rings, and Gudgeon Pin—The Connecting Rod—The Crank Shaft—Valves and Cam Distributor Gear—Induction and Exhaust Passages—Engine Power and its Variations—The Cooling System—The Crank Case and Lubricating System—Speed Regulation—Engine Starting—The Two-Stroke Engine—The Rotary Engine—The Laws of Similarity—Engine Testing and three Appendices, giving derivation of formuls and table of atmospheric constants.

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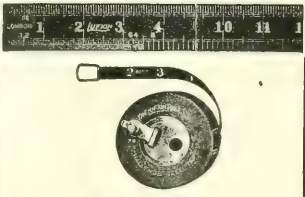
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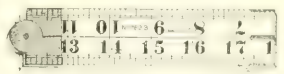
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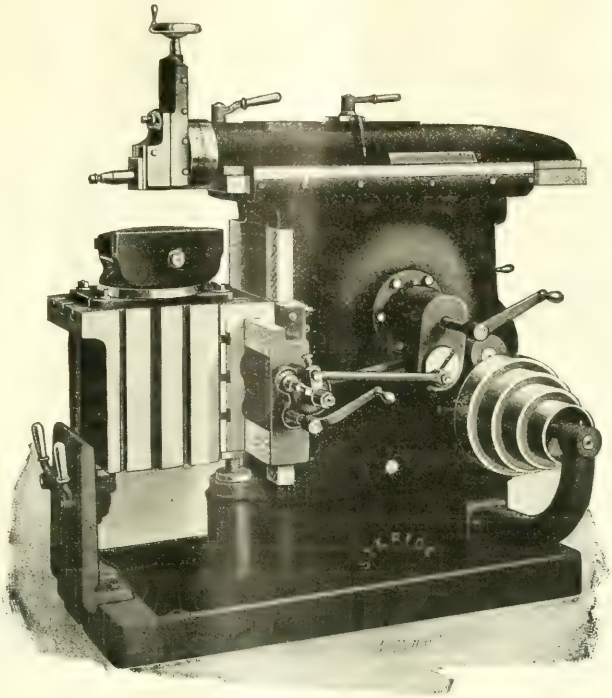
1 [illegible] 60 ft. x 30 in. x 3-16 in. St[illegible]

1 Lidgerwood Single Drum Friction Hoist, 10 x 12-54 in. and extra piston. Corrugated Drums built to carry 1100 ft. 1 in. rope. Load 4,500 lbs. Maximum speed 800 ft. per minute at 100 lbs. [illegible] Including Dial Indicator.

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A serious and earnest young man, who admitted that he had been called in Paris one of the "steel kings of France," arrived in New York by the French liner Espagne, with a contract for the construction over the Danube for the Roumanian Government of a big suspension bridge, one of the finest in the world. He is Reginald Ford, English born, but a citizen of France, where he has resided ten years, or since he was nineteen. His Paris address is 14 Rue Auber, and the great nail that pierces his illuminated sign there indicates that his specialty has been making nails. He admitted that he controlled the nail market of Europe, and that he had supplied all the nails for the boots of the poilus. He also sold to the French Government the telautograph, whereby the officers of the general staff of the French army could communicate directly with the army office in Paris or with the trenches. Mr. Ford said he was not related to Henry, although his Paris sign sometimes gave the impression to Americans in Paris that it might be that of the automobile maker, having no front name to it. Mr. Ford will stop several days at the Ritz-Carlton before going to Montreal, where he expects to place the contract for the building of the Roumanian bridge. He said frankly he was seeking financial backing for the projects that the Roumanian Government wishes him to promote and that he hoped to interest financiers of New York city. He said he was authorized to make contracts extending to at least $50,000,000.

Mr. Ford is unmarried, of youthful aspect, smooth shaven, dark eyed, good looking, cool and full of business confidence. He did not offer much voluntary information, but answered questions promptly.

The Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, have issued a booklet featuring the Lodge & Shipley line of lathes. In it is given a resume of the fundamental sales policy of the Lodge & Shipley Machine Tool Co.

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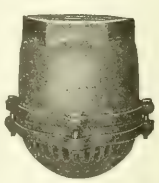
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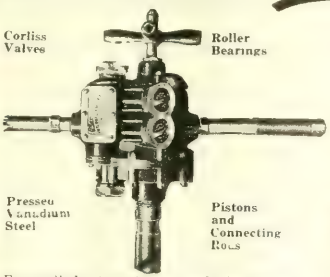
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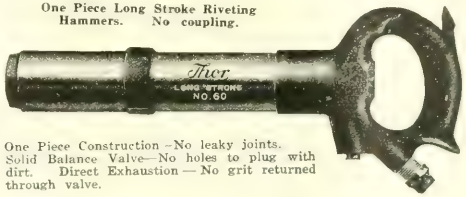
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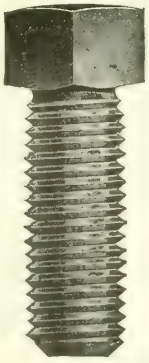
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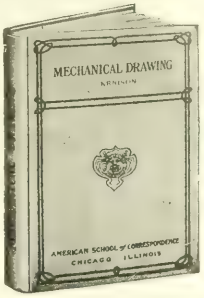
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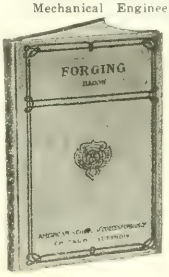


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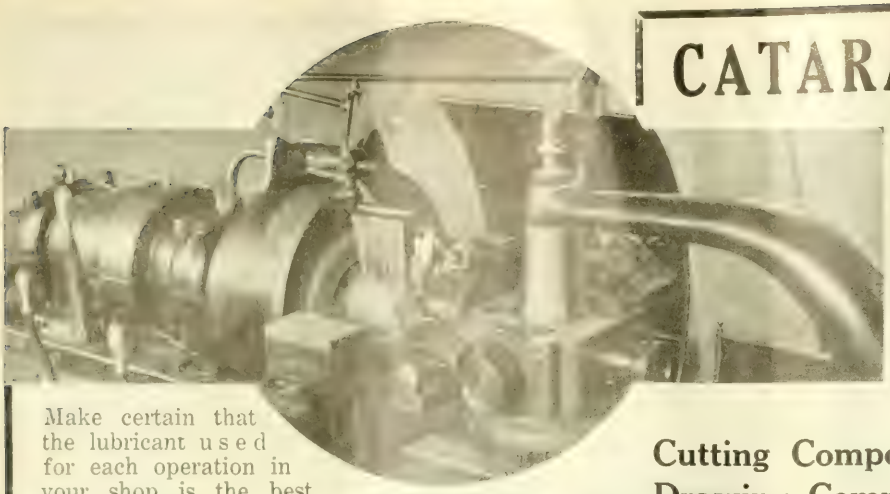


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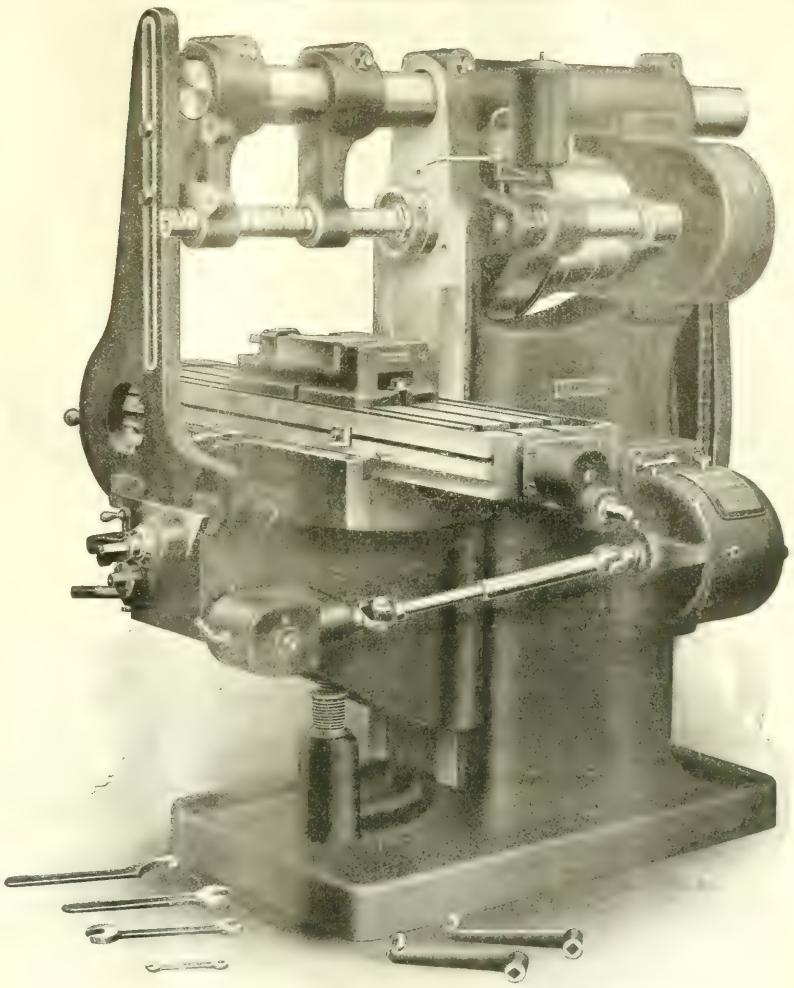
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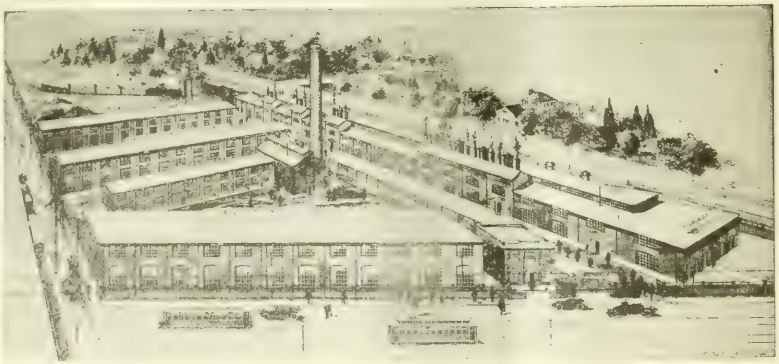
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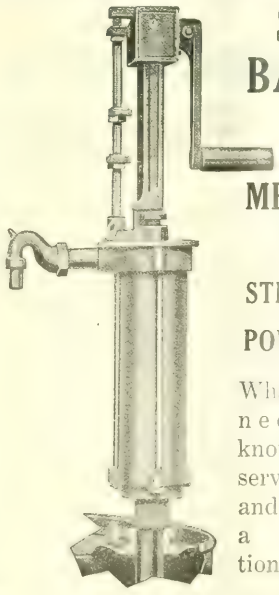
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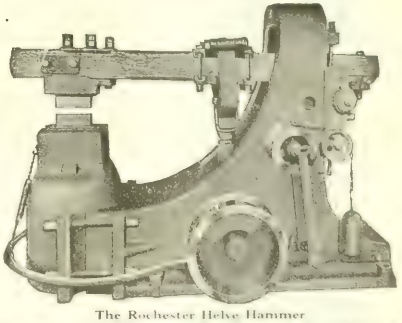
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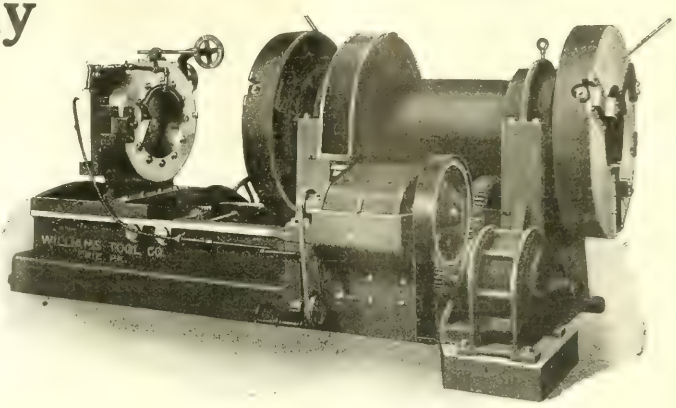
Williams Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.

The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie - Penn. - U.S.A.

Canadian Agents:
The A. R. Williams Machinery Co., Limited, Toronto, Canada

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Opportunity Knocks Here Every Week!

It may not knock for **you** this week, but read these pages regularly and grasp the opportunity when it presents itself. Every ad here is an opportunity for someone! Your time is coming. If you think the time is ripe to spring that little proposition of yours, send in your copy now for the next issue. If it is of interest to our readers, rest assured it will get attention.

CANADIAN MACHINERY
Classified Advertising Section
143 University Avenue TORONTO

Does Your Roof Leak?

A ROOF is always subjected to the never ceasing "tearing down and wearing off" tendencies of rain, hail, snow, sleet, heat, cold, etc.

These deteriorating elements soon get the better of the roof, and one leak after another begins to annoy the occupants, inflicting considerable damage to property, material, etc.

In order to eliminate these leaks, the roof must be given a protective coating. This coat must be able to stop all present leaks and prevent further decay.

Liquid Cement Makes This Possible

The Reason Why---

It is a rubberlike, adhesive and tough preparation made from the finest Canadian Asbestos Fibre combined with Pine Pitch, Creosote and other durable oils, producing an absolutely waterproof roof coating.

IT fills in and seals all holes and crevices as it passes over the surface. An impervious and unbreakable film forms as the cement dries. This film is unaffected by weather conditions and does not shrink, crack or peel. This is due to the elasticity of the cement which enables it to expand and contract with temperature changes.

It Saves Cost of a New Roof

Liquid Cement renews, preserves and prolongs the life of any roof. Results are certain and permanent.

Very Economical

Only one coat is required on the oldest surface. This coat is equal to 3 to 4 coats of ordinary liquid paint. It also eliminates the expense of painting tin and paper roofs every two years.

Easily Applied

Its application is very simple. Any person with ordinary intelligence can apply it quickly without any difficulty.

It is especially adapted for Tin, Galvanized, Iron, Gravel, Paper and Composition Roofs, and Metal Sidings.

RICE LEWIS & SON, LIMITED

Established 1847

19 Victoria Street - Toronto, Ont.



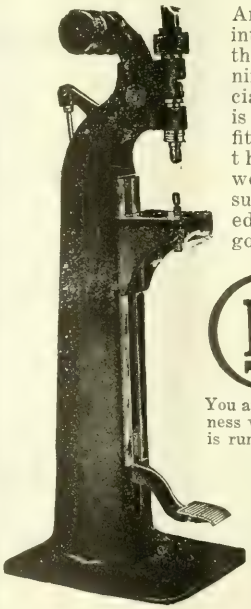
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Canadian Forges are designed for the particular work they are required to do.

Our Catalogs 100 and 108-16 describe our full line—Write for a copy

CANADIAN BLOWER & FORGE CO., LTD.
Kitchener, Ontario

No Skill Required



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The GRANT is noiseless

You are assured of perfect quietness wherever the **Grant Rotary** is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

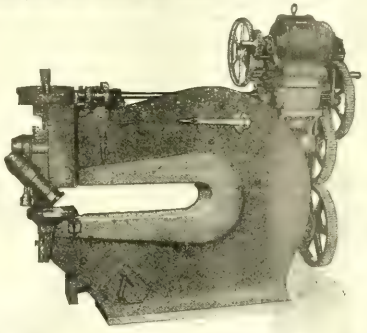
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Mfg. & Machine Co.
Bridgeport Conn.
U. S. A.

H. COLLIER SMITH
"QUICKWORK"
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

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P X H

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Taking the Guesswork Out of Files

You don't have to take your files any more on trust since P.H. and Imperial Files have been on the market.

Steel and workmanship are the best that can be procured, and performance and wear are guaranteed.

Your money back without question if they fail to stand up.

We know

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Let us prove it.

INGERSOLL FILE COMPANY, LIMITED
INGERSOLL, ONTARIO

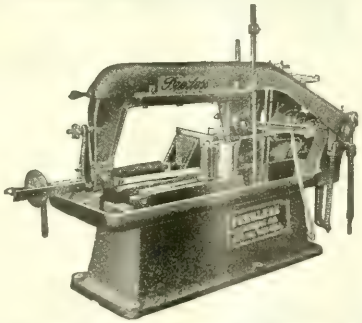
JOHN MORROW SCREW & NUT COMPANY, LIMITED
INGERSOLL *Sole Distributors* ONTARIO

IMPERIAL

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Peerless HIGH SPEED

Has Proven Its Efficiency Where Others Have Failed



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Many concerns who were persuaded only with the greatest difficulty to try their first "Peerless," because they "just knew it would turn out like the others," are to-day among the largest and best-satisfied users of our High-Speed Saws.

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is equipped with
TRAHERN Lubricating Pump

The Merrill Mfg. Company recognizes the increased efficiency of their product when equipped with good lubricating pumps.

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HEATING and PLUMBING CONTRACTOR
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Machine Work Wanted for Lathes, Shaper, Milling Machine and Planer, etc.

Quotations given on all classes of work. Wrought Iron Pipe Bends made to order, ¼ to 8". Pipe Cut and Threaded, ⅛ to 12".

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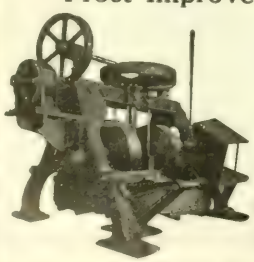
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IRON OR STEEL BODY
The last word in chuck construction.
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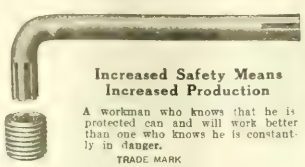
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Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
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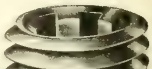
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A workman who knows that he is protected can and will work better than one who knows he is constantly in danger.

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SAFETY SET SCREWS

Protect the workman. Free from the need of watching projecting screws which might catch his clothing, he has more time to devote to his work. You yourself will be freed from worry over the safety of your men. And you will be free from law suits, too.
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The Bristol Co., Waterbury, Conn., U.S.A.





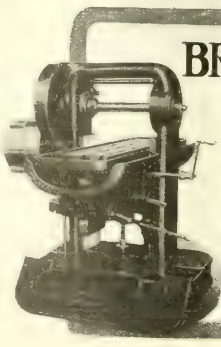


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Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.



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Oliver Machinery Co., Grand Rapids, Mich.



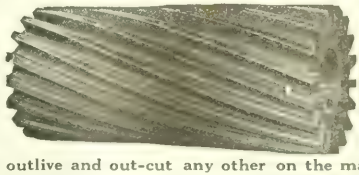
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BEST QUALITY
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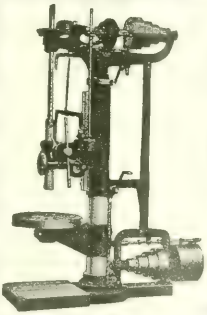
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Taylor-Newbold Milling Cutters



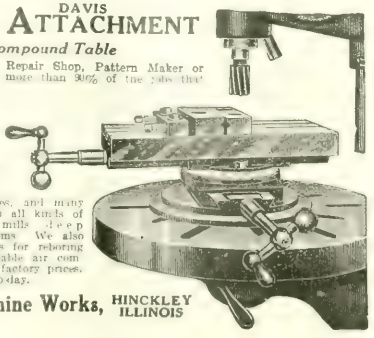
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Send for Bulletin R-P and 30-day trial offer.
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A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal, and surface grinding. An all-around machine for your tool-room.
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Greenfield Machine Co.
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instantly obtained, are but one of many advantages provided by
SILVER DRILLS
For 64 years these upright Drilling Machines have served well in the States and Canada.
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THE DAVIS
MILLING ATTACHMENT
and Compound Table
For the Die Maker, Repair Shop, Pattern Maker or Garage, will perform more than 90% of the jobs that come up.



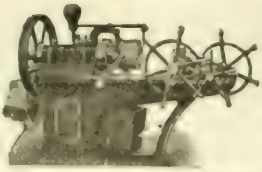
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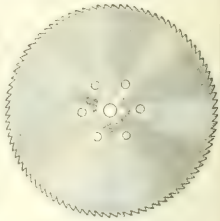
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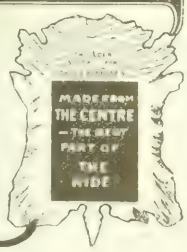
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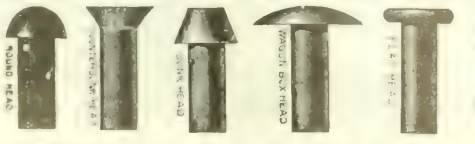
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Special Machines.

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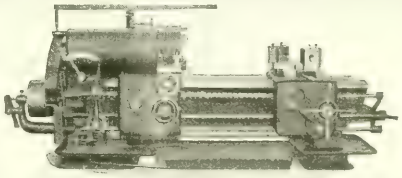
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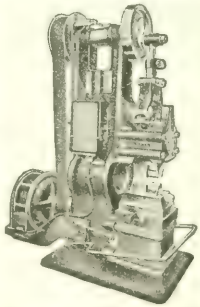
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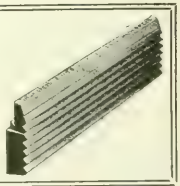
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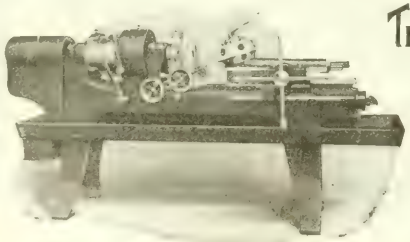
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THE TILTED TURRET Lathes and Screw Machines

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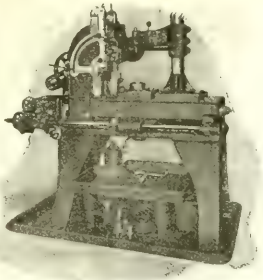
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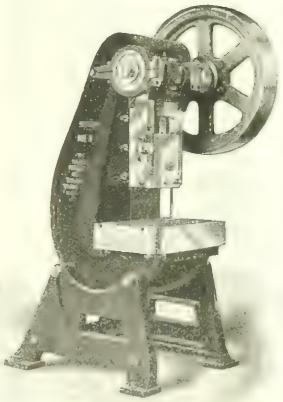
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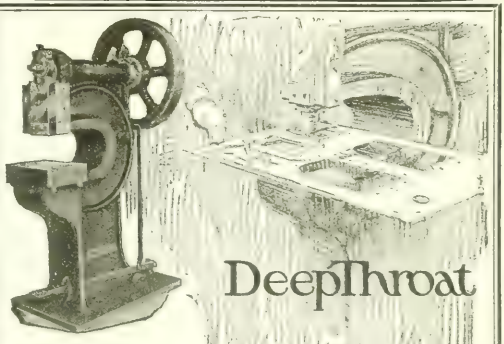
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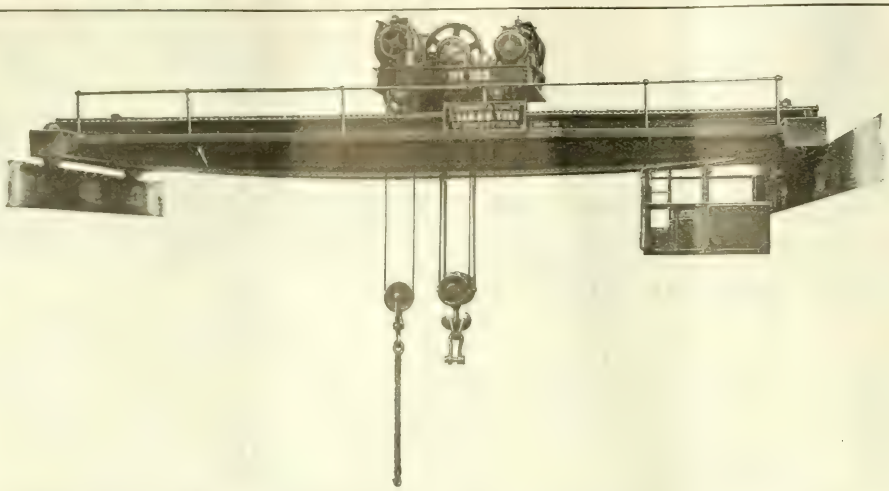
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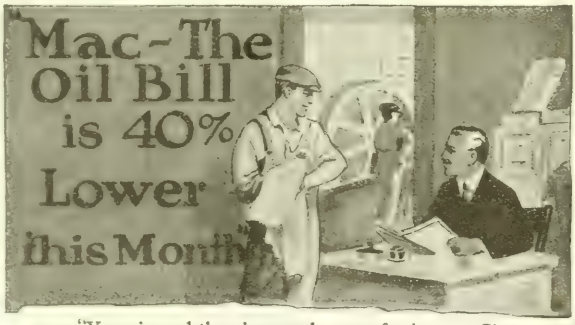
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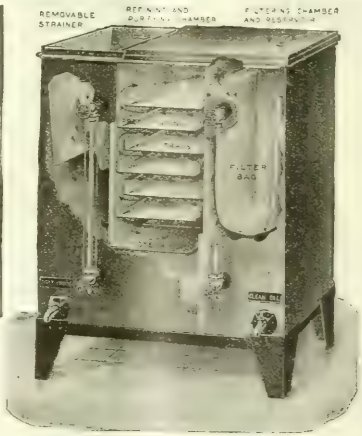
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CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal Que.
Wright Mfg Co., Lisbon, Ohio.

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Morse Chain Co., Ithaca, New York.

CHAINS, BICYCLE
Morse Chain Co., Ithaca, New York.

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Morse Chain Co., Ithaca, New York.

CHAINS, DRIVE
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CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, New York.

CHAINS, SPROCKET WHEEL
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Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
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Morse Chain Co., Ithaca, N.Y.

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Norton, Ralph B., Agent, Montreal.

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Norton, Ralph B., Agent, Montreal.

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Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
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Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Limited, Montreal, Que.

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Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., The E., New London, Conn.
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CHUCKS, DRILL, AUTOMATIC AND KEYLESS
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Whitney Mfg. Co., Hartford, Conn.

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Victor Tool Co., Waynesboro, Pa
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Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
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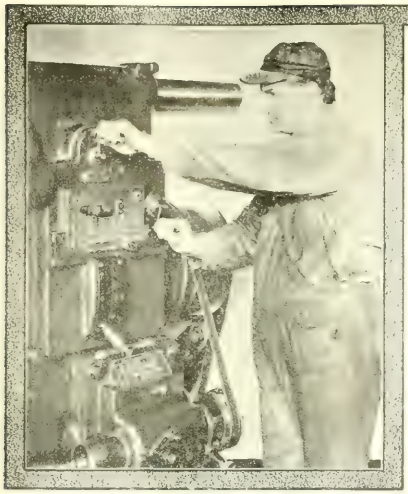
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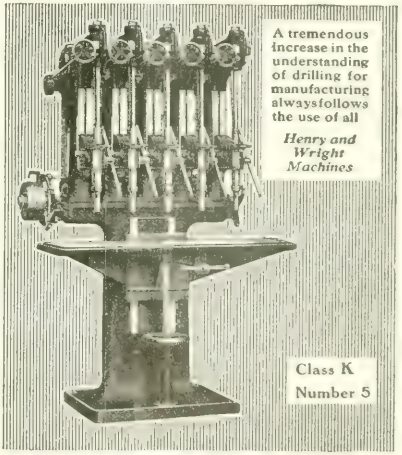
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COOLERS
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Jones & Glassco, Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
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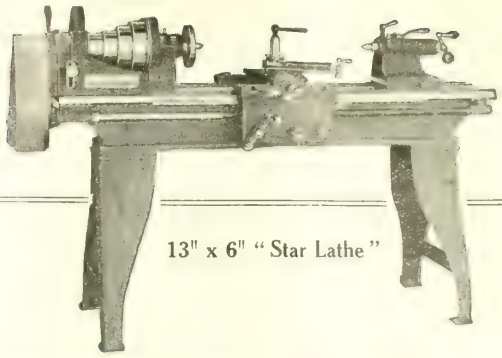
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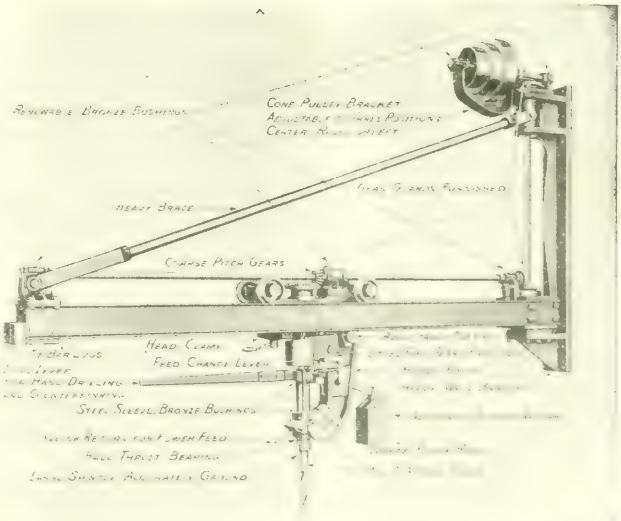
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Canadian Fairbanks-Morse Co., Montreal.
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Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ont.
Hoyer & Wright Mfg. Co., Hartford, Conn.
A. R. Jardine & Co., Hespeler, Ont.
Lundin Tool Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
New Britain-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill

DRILLING MACHINES RADIAL AND TURRET
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Hoyer & Wright Mfg. Co., Hartford, Conn.
Lundin Tool Co., Waynesboro, Pa.
New Britain-Pond Co., New York.
Rockford Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont
Hoyer & Wright Mfg. Co., Hartford, Conn.
Lundin Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
New Britain-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Oesterlein-Stubbs Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Acme Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Cincinnati Machine Co., Hamilton, Ont.
Gridley & Lewis Mfg. Co., Fond du Lac, Wis.
Hulse (Hamilton), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Hoyer & Wright Mfg. Co., Hartford, Conn.
A. R. Jardine & Co., Hespeler, Ont.
Lundin Tool Co., Waynesboro, Pa.
R. McGregor & Co., Galt.
New Britain-Pond Co., Richmond, Indiana
Rockford Machine Co., Worcester, Mass.
New Britain-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Sidney Mfg. Co., Sidney, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, SPECIAL
Gridley & Lewis Mfg. Co., Fond du Lac, Wis

DRILLING MACHINES, VERTICAL
Gridley & Lewis Mfg. Co., Fond du Lac, Wis

DRILLING MACHINES, WALL RADIAL
Ingersoll-Rand Co., Boston, Mass.
Wilson Hardware Co., Bangkok, Siam

DRILLING POSTS
Acme Tool Works, Aurora, Ind.
Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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Adams Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Hulse (Hamilton), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Hoyer & Wright Co., Dundas, Ont.
Kaye, Lawrence & Son, Toronto, Ont.
Lundin Tool Co., Waynesboro, Pa.
Oesterlein-Stubbs Electrical Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Adams Hardware Co., Toronto, Ont.
Cincinnati Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Viger Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

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Anchenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cincinnati Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy & Supply Co., Montreal
A. R. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

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Adams & Westlake Co., Elkhart, Ind.
Wm. Sheffield Edge Tool Co., Sheffield, Eng.
Jessop, Wm., & Sons, Ltd., Sheffield, Eng.
Morrow Screw & Nut Co., Ingersoll, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
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Armstrong, Whitworth of Canada, Montreal, Que.
Atha & Illingworth, Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Manning, Maxwell & Moore, Inc., New York.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Pfeiffer, J., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
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Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Morse Twist Drill & Mch. Co., New Bedford, Mass
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Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. R. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Moronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
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Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

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Coventry Chain Co.
Jones & Glasco, Montreal.
Morse Chain Co., Ithaca, N.Y.

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MacKinnon Steel Co., Sherbrooke, Que.

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DUST HANDLING EQUIPMENT
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Standard Machy. & Supplies, Ltd., Montreal, Que.
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
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Canada Emery Wheels Co, Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
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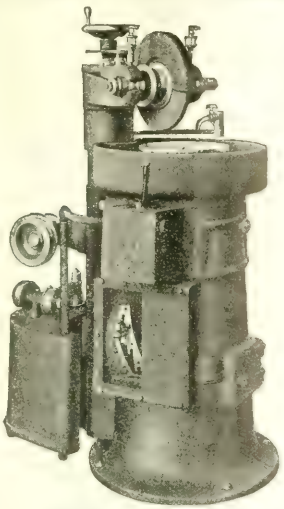
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Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
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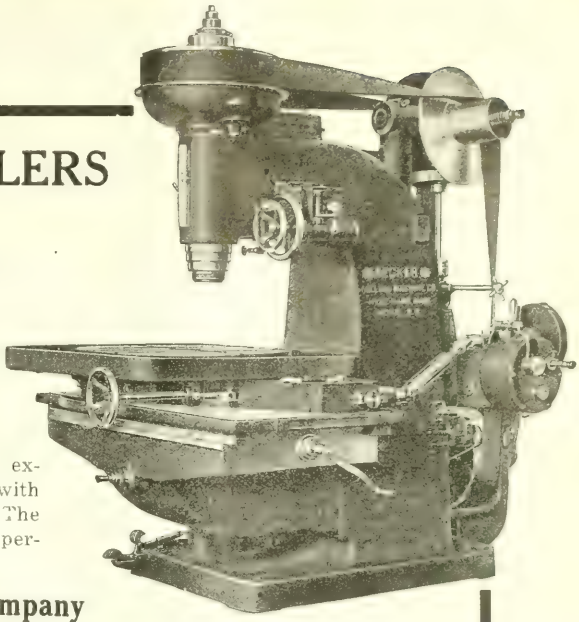
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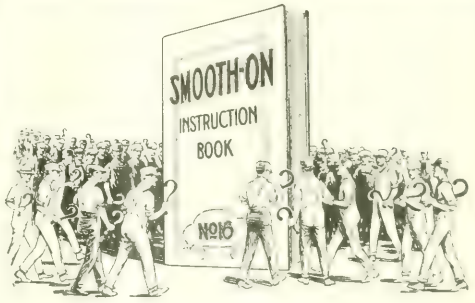
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Can. Fairbanks-Morse Co., Montreal.
Gardner-Walker Machy. Co., Toronto, Ont.
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Williams & Wilson Ltd., Montreal, Que.

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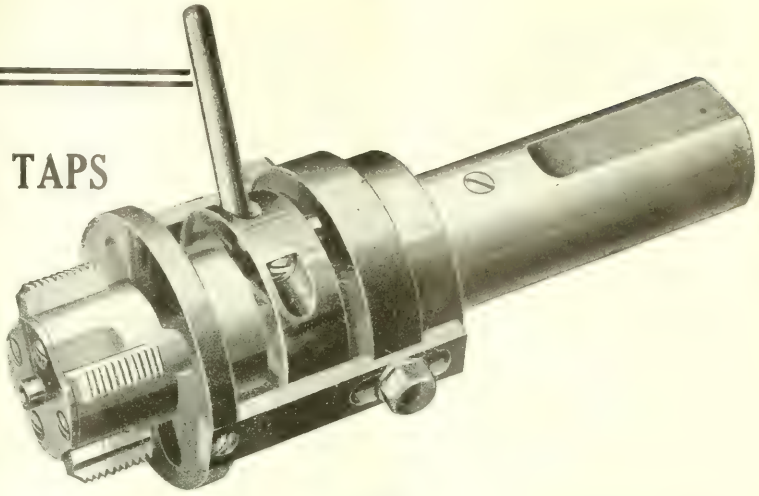
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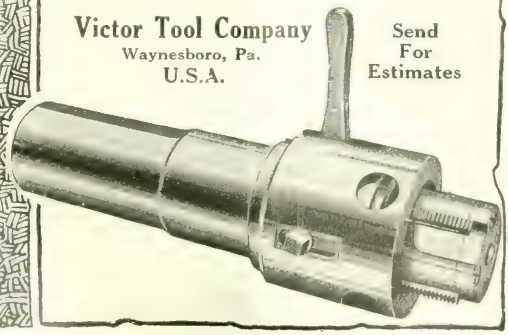
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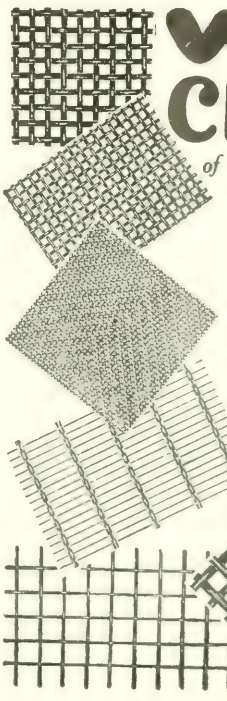
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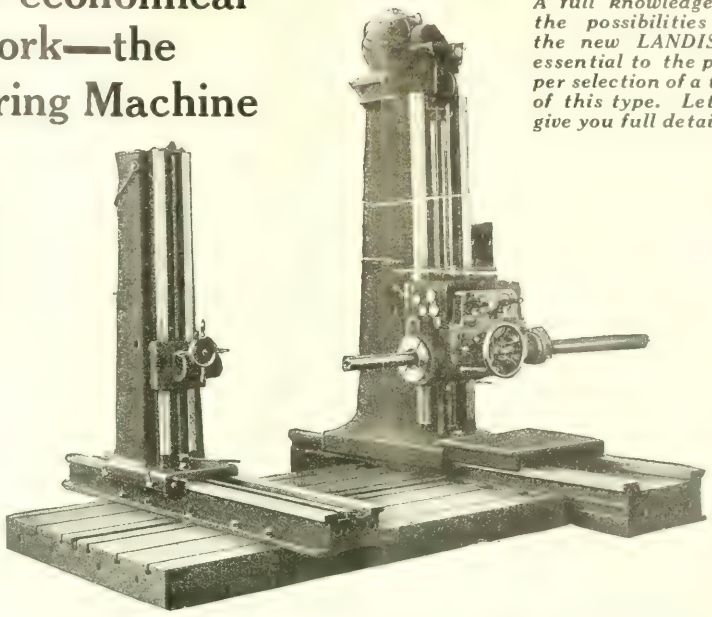
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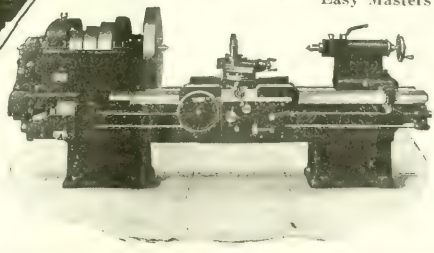
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Toledo Machine & Tool Co., Toledo.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
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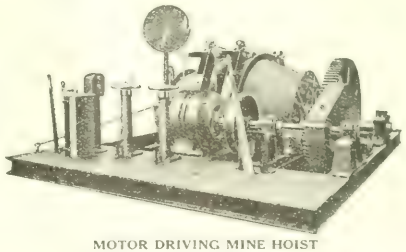
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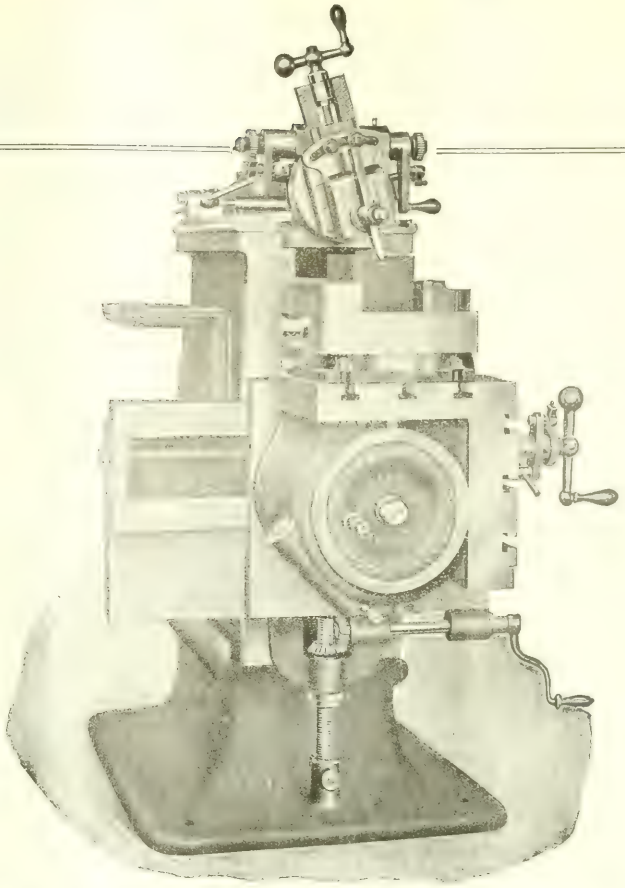
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TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
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Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
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VALVE GRINDERS (PNEUMATIC)
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Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto.
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Williams & Co., J. H., Brooklyn, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Barnes, Wallace, Co., Bristol, Conn.
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Morrow Screw & Nut Co., Ltd., John, Ingersoll.
Norton, Ralph B., Agent, Montreal.
London Bolt & Hinge Works, London, Ont.
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WASTE
United Brass & Lead Ltd., Toronto.
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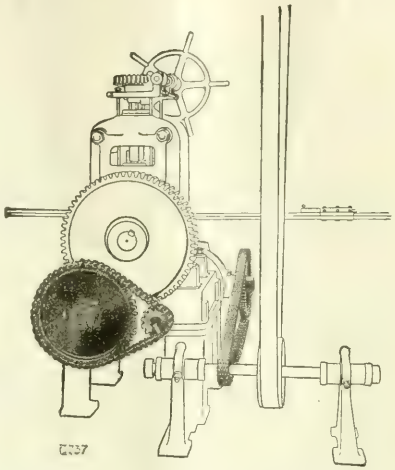
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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

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EDITORIAL CONTENTS

MAKING THE HOLLIFIELD TARGET PRACTICE ROD 651

AUDIBLE ELECTRIC SIGNALS IN INDUSTRIAL PLANTS 654

MAKING STEEL IN CANADA 655

CANADIAN MACHINERY DRAFTING COURSE 671

WHAT OUR READERS THINK AND DO 674

DEVELOPMENTS IN SHOP EQUIPMENT 676

EDITORIAL 680

MARKET DEVELOPMENTS 682

SELECTED MARKET QUOTATIONS 687

INDUSTRIAL DEVELOPMENTS 689

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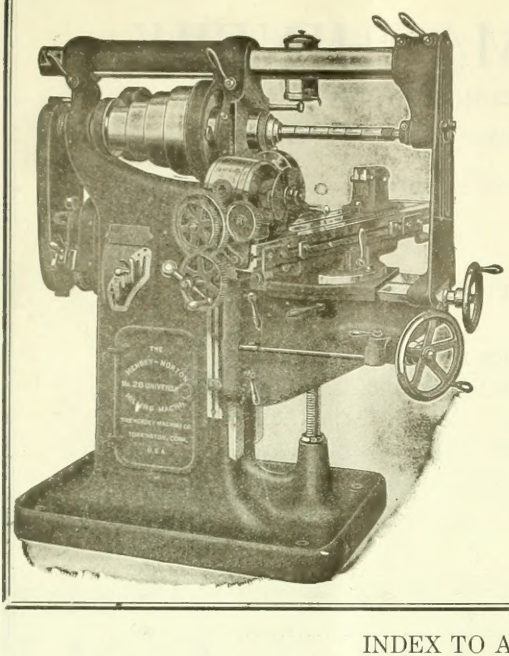
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INDEX TO ADVERTISERS

A

Algoma Steel Corporation 4
Allentown Experimental Works..... 73
Almond Mfg. Co. 24
Anderson, Geo. A. 88
Armstrong Bros. Tool Co. 89
Atkins, Wm. 15
Aurora Tool Works 101

B

Baird Machine Co. 91
Ballantyne, James 88
Banfield & Co., W. H. 71
Barnes, Wallace, Co. 7
Barnes Co., W. F. & John..... 101
Bemis & Call 22
Becker Milling Machine Co. 103
Bertram & Sons Co., John...
Front cover, 1
Bertrams, Ltd. 70
Betts Machine Co. 5
Bicknell-Thomas Co. 24
Blake & Johnson 96
Bliss Co., E. W. 93
Boker & Co., Inc., H. 14
Bowser Co., Ltd., S. F. 94
Brantford Oven & Rack Co..... 70
Brantford Emery Wheel .....
Bridgeford Mach. & Tool Works..... 5
Bristol Company 88
Bristol Machine Tool Co. 101
Broadbent & Son, Thomas 94
Brockville Foundry Co. 90
Brown & Sharpe Mfg. Co. 97
Budden, Hanbury A. 71
Butterfield & Co., Inc. 22

C

Canada Foundries & Forgings, Ltd. 13
Canada Machinery Corporation.....
Outside back cover
Canada Metal Co. 15
Can. Wire & Iron Goods Co. 107
Can. Blower & Forge Co. 86
Can. Drawn Steel Co. 91
Can. Dryer-Harris Co., Ltd..... 73
Can. Fairbanks-Morse Co. 72
Can. Ingersoll-Rand Co. 6
Can. Steel Foundries 3
Carlyle Johnson Mach. Co. 3
Cataract Refining Co. 89
Chapman Double Ball Bearing Co.. 10
Classified Advertising 72
Cleveland Wire Spring Co. 71
Consolidated Optical Co. 92
Consolidated Press Co. 83
Coventry Chain Co. 118
Cushman Chuck Co. 20

D

Darling Bros., Limited 89
Davidson, Thos. 83
Davis-Bournonville Co. 91
Dominion Forge & Stamping Co.... 18
Dominion Foundries & Steel, Ltd. 11
Dominion Belting Co., Ltd. 70
Dominion Bridge Co. 82
Dunbar Bros. Co., The 111

E

Eastern Machine Screw Corp. 21
Electric Steel & Metals, Ltd. 8
Elliott & Whitehall 76

F

Federal Engineering Co. 69
Fetherstonhaugh & Co. 71
Fitchburg Grinding Machine Co. ... 92
Financial Post of Canada 103
Firth & Sons, Thos. 14
Fleek, Ltd., Alexander 68
Ford-Smith Machine Co. 10
Foss Mach. & Supply Co., Geo. F.
Inside back cover
Forrest, Jackson & Forrest 99
Frost Mfg. Co. 88
Fry's (London), Ltd. 16

G

Galt Machine Screw Co. 77
Gardner & Son, Robt. 76
Garlock-Walker Machy. Co. 73
Garvin Machine Co. 26
General Steel Co. 8
Geometric Tool Co. 95
Giddings & Lewis Mfg. Co. 81
Gilbert & Barker Mfg. Co. 24
Gisholt Machine Co. 81
Goodyear Tire & Rubber Co.....18, 19
Gooley & Edlund 88
Grant Gear Works 90
Grant Mfg. & Machine Co. 86
Gray Ball Bearing Co. 87
Greenfield Machine Co. 69
Greenleafs, Ltd. 78
Greenfield Tap & Die Corp..... 27

H

Hamilton Co., Wm. 75
Hamilton Gear & Machine Co. 92
Hamilton Motor Works 74
Hanna & Co., M. A. 14
Hardinge Bros. 25
Hawkridge Bros. 70
Hendey Machine Co. 120
Henry & Wright Mfg. Co. 97
Hepburn, John T. 12
Hinckley Mach. Works 89
Hoefer Mfg. Co. 11
Hollander Machinery Co. 74
Hope & Sons, Henry 77
Hoyt Metal Co. 118
Hull Iron & Steel Foundries..... 82
Hunter Saw & Machine Co. 93
Hurlbut, Rogers Machinery Co. 91

I

Illingworth Steel Co., John 13
Independent Pneumatic Tool Co.... 75
Ingersoll File Co. 87

J

Jacobs Mfg. Co. 20
Jardine & Co., A. B. 13
Johnson Machine Co., Carlyle 8
Joyce-Koebel Co. 28

K

Katie Foundry Co. 15
Kempsmith Mfg. Co. 12
Keystone Mfg. Co. 26

L

Lancashire Dynamo & Motor Co.... 111
Landis Machine Co. 12
Landis Tool Co. 103
Latrobe Electric Steel Co. 9
London Bolt & Hinge Works..... 68
Lufkin Rule Co. 71
Lynd-Farquhar Co. 99

M

MacLean's Magazine 115
Magnolia Metal Co. 84
Manitoba Steel Foundries, Ltd..... 91
Marion & Marion 71
Marshalltown Mfg. Co. 84
Matthews & Co., Jas H. 33
McDougall Co., Ltd., R. 33
McFarlane Eng. Co., W. G. 72, 73
McLaren Belting Co., J. C. 30
Mechanical Engineering Co. 23
Metalwood Mfg. Co. 77
Morrow Screw & Nut Co., Ltd., J... 63
Morton Mfg. Co. 71
Murchey Machine & Tool Co. 22

N

National Acme Co. 107
National Automatic Tool Co. 71
National Machinery Co. 30
New Glasgow Machine Co. 72
Nicholson File 105
Niles-Bement-Pond....Inside front cover
Northern Crane Works 89
Norton, A. O. 91
Norton Co. 28
Norton Grinding Co. 29
Nova Scotia Steel & Coal Co..... 41

O

Oakley Chemical Co. 90
Oliver Machinery Co. 89

P

Page Steel & Wire Co. 91
Pangborn Corporation 91
Parmenter, Bulloch Co. 90
Peerless Machine Co. 87
Plewes, Ltd. 71
Positive Clutch & Pulley Works... 93
Pratt & Whitney....Inside front cover
Pritchard, Andrews Co. 9
Puro Sanitary Drink'g Fountain Co. 70

Q

Quickwork Co. 87

R

Racine Tool & Machine Co..... 16
Rice Lewis & Sons, Ltd..... 86
Rochester Ball Bearing Co., Inc. ... 90
Rockwell Co., W. S. 24
Roelofson Machine & Tool Co..... 113

S

Seneca Falls Mfg. Co. 99
Sheldons, Limited 77
Shipman & Co., Harold C. 73
Shuster Co., F. B. 88
Sidney Tool Co. 109
Silver Mfg. Co. 89
Simonds Canada Saw Co. 6
Skinner Chuck Co. 18
Smalley-General Co., Inc. 25
Smart Turner Machine Co. 74, 75
Smooth-On Mfg. Co..... 103
Standard Fuel Engineering Co. 24
Starrett Co., L. S. 17
Steel Company of Canada 3
Steele Ltd., James 68
Steinle Turret Machine Co..... 91
St. Catharines Machinery Co. 74
St. Lawrence Welding Co., Ltd..... 76
Stoll Co., D. H. 88
Strong, Kennard & Nutt Co. 103
Swedish Crucible Steel Co..... 74
Swedish Steel & Importing Co..... 6

T

Tabor Mfg. Co. 89
Taylor Tool Co., J. A. M..... 76
Toledo Machine & Tool Co..... 93
Toomey, Inc., Frank 74
Toronto Iron Works 75
Trabern Pump Co. 87

U

Union Mfg. Co. 22
United Hammer Co. 91
United States Elec. Tool Co..... 30
Universal Grinding Machine Co. 92

V

Vanadium-Alloys Co. 12
Victor Tool Co. 107
Victoria Foundry Co. .....
Vulcan Crucible Steel Co. 6

W

Welding & Supplies, Ltd. 77
Wells Bros. of Canada, Ltd..... 27
West Tire Setter Co. 83
Wheel Trueing Tool Co. 83
Whiton Mach. Co., D. E. 93
Wilkinson & Kompass 92
Williams Machinery Co., A. R..... 63
Williams & Co., J. H. 85
Williams Tool Co. 85
Wilson & Co., T. A. 99
Wilson & Co., J. C. 12
Wilt Twist Drill Co. 7
Windsor Machine & Tool Works..... 77
Wisconsin Electric Co. 97
Wood Turret Machine Co. 92

Z

Zenith Coal & Steel Products..... 73

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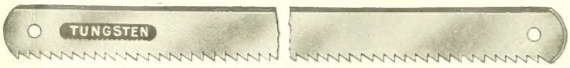
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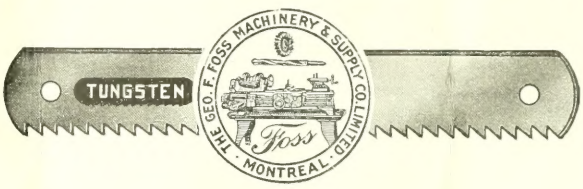
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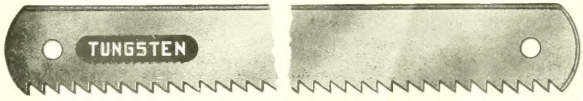
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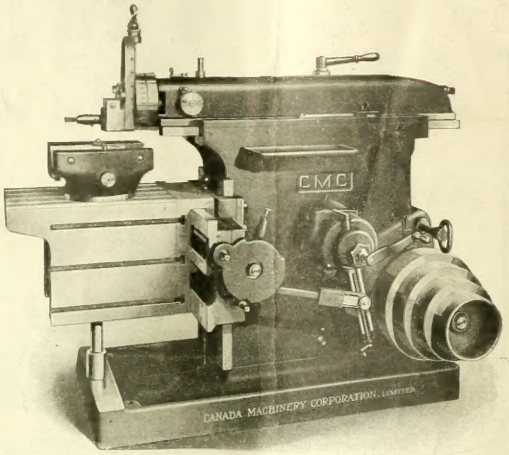
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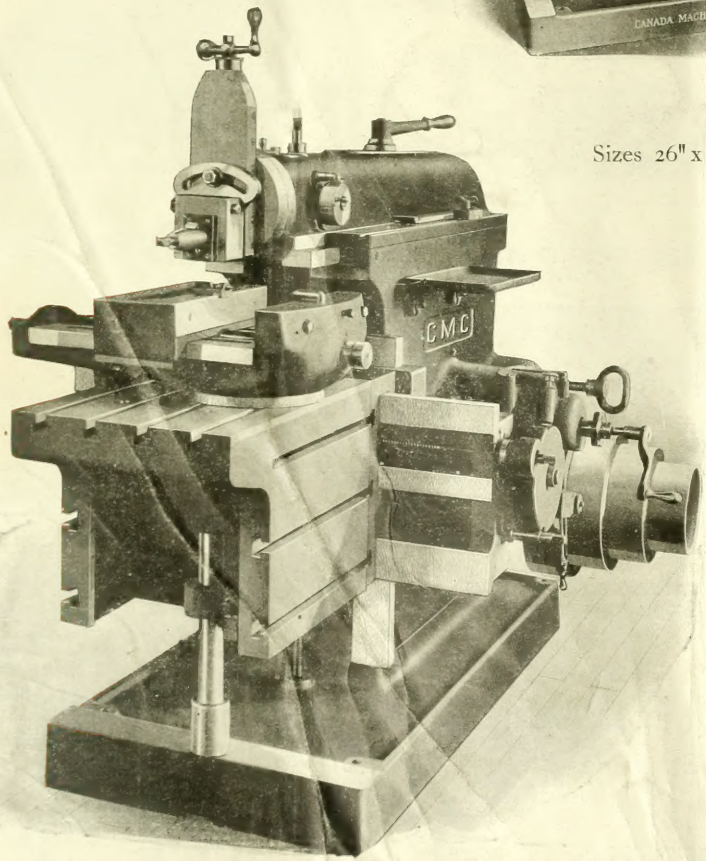
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